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assembly & fastener ENGINEERING

NOVEMBER • 1960



Will Audio-Visual Systems Obsolete Assembly Lines?

Also in this Issue:

- Parker Pen Goes to Automatic Assembly**
- Determining Required Torque with a Tension-Tester**
- Ultrasonic Welding: Optimizing the Variables**

this man
had a
fastener
problem...

**and here's how
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assembly & fastener

ENGINEERING



November, 1960

Volume 3, Number 11

FEATURES

Ultrasonic Welding: Optimizing the Variables

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Proper use of this joining method required understanding of five variables: tip geometry, frequency, power, time and clamping force.

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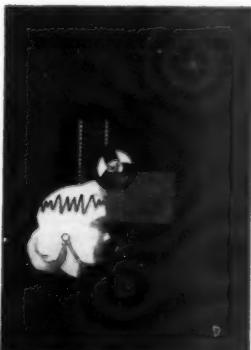
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* Built around 35 mm slides and synchronized tape playback, audio-visual assembly techniques are growing in popularity. For a complete discussion, turn to page 42.



EPA

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USO-77

Letters to the Editor

Voting Protection from Ourselves

As part of our program of personal and professional development, the Junior Section of the Engineering Society of Detroit makes available through "The Lookout" views and thoughts from current literature.

Your editorial, "It's Time to Vote Protection from Ourselves", from your October issue has been selected by our program committee for possible distribution, and we would like your permission to mimeograph approximately 300 copies of the editorial and distribute them by mail to our members.

Charles E. Sweet, Jr.
Program Committee
Junior Section
Engineering Society of Detroit
Detroit, Michigan

- Reprint permission is hereby granted to anyone interested in further distribution of this editorial.

Lubrication and Bolt Torque

I have read with great interest the article in September entitled "How Lubrication Affects Torque-Tension Relationship."

There is so much meat in this article that I would appreciate a copy for my files.

M. S. Parkhill
Design Counselor
Gas and Diesel Engines
Ingersoll-Rand Company
Painted Post, New York

- As soon as reprints of this article are completed, their availability will be announced in our reprint box.

Congratulations on the report on lubricated fasteners. This is information which should have been published years ago. Just think how many automotive heads and diesel heads would have been saved from warping if this information had been available.

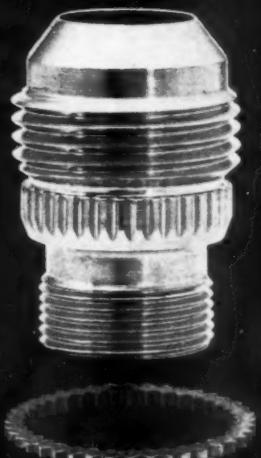
This is a timely and factual article. See if you can possibly get one like it on solid film fasteners.

John T. Heaton
President
Champion Products, Inc.
Stephenville, Texas

- Several more articles on this subject are scheduled for publication in the next few months.

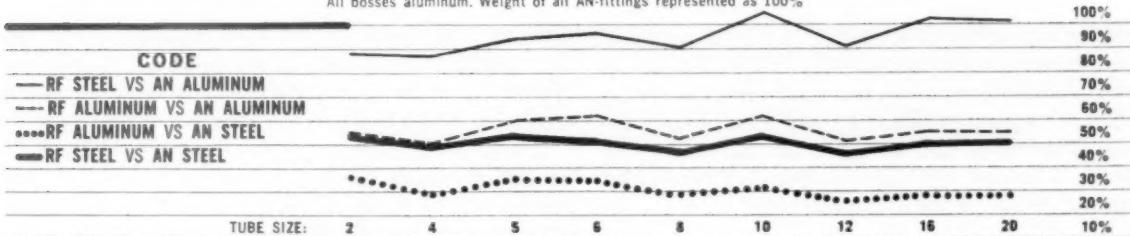
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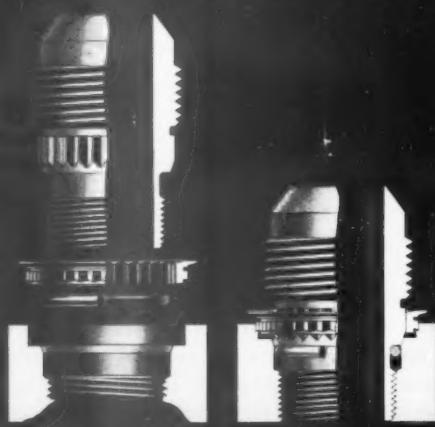


ROSAN RF-FITTINGS IN % BY WEIGHT OF AN-FITTINGS, MINIMAL BOSS INCLUDED.

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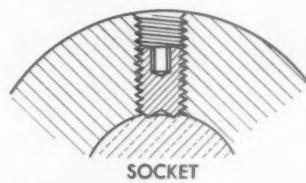
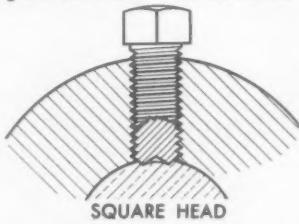
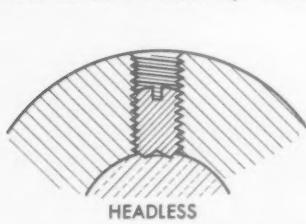
TIPS ON FASTENER APPLICATIONS BY STANSCREW



How to Choose the Best Set Screw for Your Application

American Standards recognize three different types of set screws . . . socket, square head, and headless (sometimes called slotted). Each type possesses ad-

vantages for certain particular applications . . . as indicated below. Here are characteristic drawings of these three different types.



All are shown with cup point. All standard points are discussed later.

What's the Best Size?

For the most common set screw application . . . attaching a member to a shaft . . . the diameter of the set screw varies directly with the diameter of the shaft. A common error is to use a set screw that is too small. For maximum holding power, the largest diameter possible should be used, but normally this diameter is limited to 33% of the shaft diameter by the configuration of the mating parts.

Factors to Consider

In selecting a set screw for a given application, the designer's first consideration is, obviously, that the fastener has adequate holding power. He should be governed, in addition, by the factors of safety, appearance, and accessibility in determining the best possible fastener for a specific use.

Selection of the right fastener becomes simplified when we recognize that the three different types of fasteners vary in four ways . . . holding power, conformation, cost, and wrenching technique. Let's briefly review all three types.

Holding Power . . . and How We Get It

The holding power of the set screw depends entirely on the pressure exerted between the point and the thread, and the point's ability to imbed itself. In other words, the holding power depends upon the tightening force which has been applied . . . "the man with the wrench".

Headless set screws, being tightened solely by a screwdriver, can only be tightened to about 75 inch-pounds. Headless set screws should, therefore, be used only for those applications requiring limited holding power, or when limited pressure is desirable

to prevent damaging fragile parts.

Socket set screws manufactured of alloy steel are normally tightened by hex keys permitting the application of much greater clamping or holding forces. Normally, in these applications, the clamping force applied is limited only by the strength of the hex key.

The external heads on square head set screws place no limitations on the type of wrenching which may be applied, up to the tensional strength of the screw itself, so that greater wrenching torques and consequent holding power is possible with these fasteners. Normally manufactured of case hardened steel, the strength of the material here can be the limiting factor, since the thread strength, and consequently the holding power, is dependent on the depth of case. It is of the utmost importance, therefore, that when these fasteners are used in applications requiring high holding power, they be of the highest quality.

Conformation is Half the Story

The wise choice for a particular application is often decided by relative conformations . . . bearing in mind the factors of safety, appearance, and accessibility.

For any application, the square head set screw differs essentially from the other two types, in that the square head must project in order to allow the application of the wrench. Sometimes this projecting head creates a safety problem. In other applications it will detract from appearance. And, obviously, in all cases a longer set screw is required if the square head type is chosen.

Accessibility . . . A Must

In selecting the proper set screw, the wise designer should always bear in mind accessibility for repair

and maintenance. For most applications, the socket set screw with its hex key wrenching provides maximum accessibility with high holding power.

How Do Costs Compare?

Size for size, headless set screws are the least expensive; followed by square heads; with socket head set screws requiring the greatest *initial* investment.

On the basis of holding power per dollar, however, square heads provide the greatest possible value . . . followed by socket heads . . . with headless providing the least holding force per dollar spent.

In evaluating costs, remember that for most applications you will need a longer square head set screw, since it must project further from the shaft in order to allow external wrenching. In many applications this may increase the cost of the square head set screw substantially, and change the cost relationships described above.

Which is the Right Point?

Evaluation of the claims made for various points is unquestionably the most controversial area in set screw selection. Although extravagant claims are made for the locking action of many different special point constructions, Stanscrew believes the only function of the point should be to provide good entry into the shaft in order to secure adequate holding power . . . the locking action is the function of the threads. This, the standard cup point does!

Stated another way, set screws should be designed to permit the application of the greatest possible fastening torque by "the man with the wrench". The precise uniformity of thickness, pitch, diameter, and lead of the threads should permit maximum contact and ample friction to lock the screw. The point should be designed to produce maximum holding action by entry into the shaft . . . without any attempt to secure an unnecessary locking action.

Significantly, American Standards recognize only the six points below. In socket set screws, all are made by Stanscrew and other leading manufacturers.

CUP POINT

The most widely used general purpose point. It should be the invariable selection for those applications where semi-permanent assembly is required and where the shaft is soft enough for entry of the cup point.



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November, 1960

5

FLAT POINT

The flat point will not mark the shaft, and is therefore desirable for applications involving continual tightening, loosening, and retightening of the set screw. It is also used in conjunction with a flat on the shaft when the shaft is too hard for the use of a cup point.



CONE POINT

Used where reasonably permanent assembly is desired. The cone point requires the "spotting" or the drilling of a hole in the shaft. For maximum effectiveness with the cone point, the angle should be precisely drilled with a 90° included angle.



OVAL POINT

Again used with a "spotting" hole, the oval point is more adaptable than the cone point—requiring less precision in the angle of the drilled spotting hole—and is sometimes used as a substitute for the cone point.



HALF DOG (and FULL DOG) POINTS

These are used in those applications where it is desired to permit some motion—either longitudinal or rotary—between the parts when used in conjunction with a longitudinal or annular groove. Where a permanent location of one part with another is desired, a hole for the reception of the point is used. The half dog construction is used for the great majority of applications of this type.

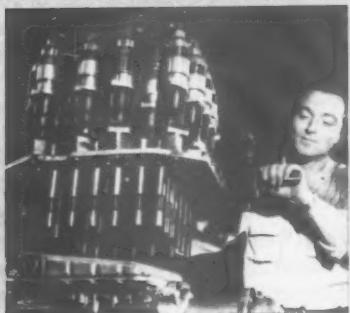
Don't Overload Inventory

The wise designer bears in mind the extra costs caused by the stocking of excessive inventories and the maintenance problem resulting from overspecialization in selecting fasteners. Therefore, whenever possible, he uses the minimum possible number of different types and sizes of set screws . . . as well as all other fasteners and components.

For Further Information

For specific information on a particular problem, simply call your Stanscrew fastener specialist. You can reach him quickly through your local Stanscrew distributor . . . who can also provide over 5,700 different Stanscrew fasteners to supply an economical, dependable answer to the overwhelming majority of all your fastener requirements.

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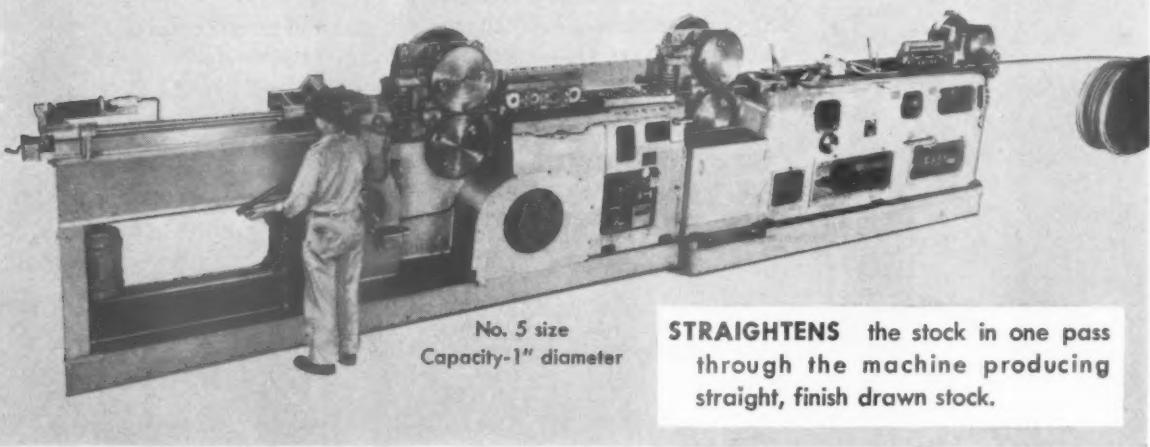
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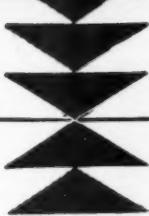
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THE EDITOR'S VIEW

NOVEMBER, 1960, VOL. 3, NO. 11

WHY DO SOME PRODUCT IMPROVEMENTS TAKE SO LONG?



One of the disturbing things about our technological age is that certain product improvements take so long to reach the consumer.

Consider the auto muffler which represents for many motorists their biggest annual replacement item. This is an economic waste for which there has been no excuse in recent years. For perhaps only a dollar or two extra, every car produced in the past few years could have been factory-equipped with a muffler designed to last the lifetime of the car.

There is one school of thought which believes that the feet-dragging in muffler improvement has been tied in with declining profit margins in the retail end of the industry. Auto dealers, for instance, are now making only a fraction of the profit made seven or eight years ago on new car sales. So a logical place to make up the difference would be in parts replacement. And here mufflers have been a most lucrative item.

Independent parts suppliers have also been cashing in on this market. Virtually every car owner has seen the ad of the supplier who guarantees his (replacement) muffler "for as long as you

own your car." He operates on the theory that you won't own your present car for more than a couple of years. But why couldn't the automotive manufacturers make at least the same guarantee?

Now, the industry is finally doing something constructive about this situation. One automotive firm is pioneering the life-time muffler on its 1961 models. It shouldn't be too long before the others jump on the bandwagon.

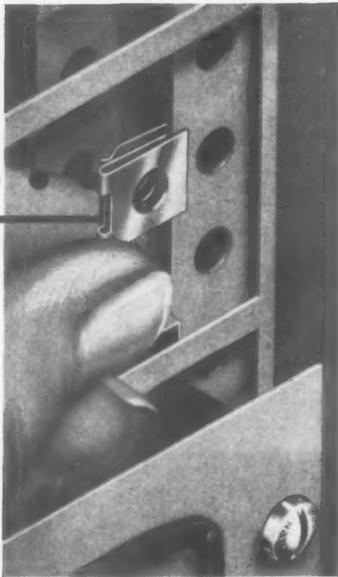
So after its first announcement a decade ago, the life-time muffler is finally a reality. It was back in 1951 that the Porcelain Enamel Institute published a brochure entitled, "101 New Uses for Porcelain Enamel." Included were porcelain enameled manifolds and mufflers which had been proved out in tests by a trucking firm. But it has taken a long time for the buying public to get a chance to benefit from this development.

In the meantime, car owners have spent many millions of dollars on muffler replacement. This has been a senseless waste.

This should make all of us wonder how many other important developments, for use by consumers and industry alike, are similarly ignored or held back for one reason or another.

Managing Editor

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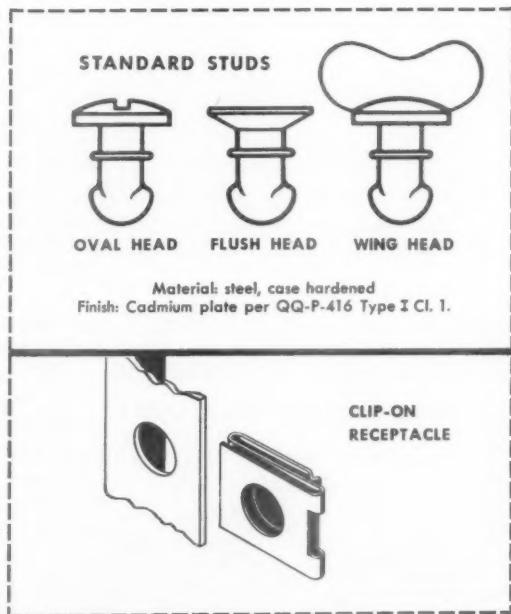
For complete information on this and other fasteners, send for your free copy of Southco Fastener Handbook, Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pa.

STANDARD STUDS

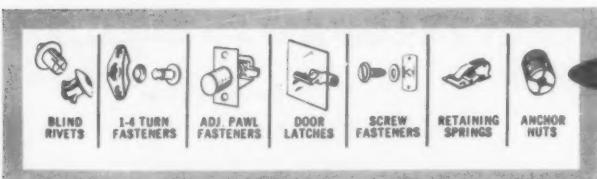


Material: steel, case hardened
Finish: Cadmium plate per QQ-P-416 Type I Cl. 1.

CLIP-ON
RECEPTACLE



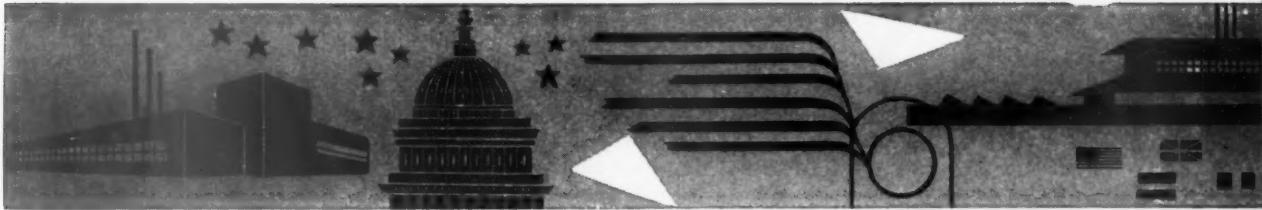
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The State of Business



FARMERS AND FARM SURPLUSES

The trek from farm to city has been a familiar characteristic of the rural scene for many years. While the farm population has been dwindling, the nation's total population has continued to increase. In 1947, one out of five persons lived on a farm; in 1959, one out of eight.

Even though the farm population has been declining, the output of agricultural commodities has continued to rise and at a faster pace than consumption. To keep farm income from falling to distress levels, the Government has acquired large quantities of commodities and diverted them from commercial markets through price support programs. Little progress has been made, however, in balancing output and demand for agricultural commodities.

The spectacular improvements in technology and a high level of new investment in agriculture have more than doubled output per man-hour of farm labor in the postwar period of 1947-59. This has offset any tendency for the decline in farm population to reduce total output. However, the shift of labor from agriculture, if carried far enough, would eliminate surpluses of farm commodities and, if carried too far, would even result in shortages. Thus, any increase in the mobility of the farm population, assuming continued expansion of the economy overall, should help to accelerate the shift of farm labor to nonagricultural pursuits. This would tend to boost incomes of farm residents and help to provide a workable solution to the persistent and costly agricultural surpluses.

Farm population has declined in all regions, but the decline has been more rapid in the South than elsewhere. Mechanization of southern farms has come somewhat later than in other regions. Also, the shift of cotton from the small farms of the Southeast to the larger farms in the Southwest and West has greatly reduced the farm labor force in the South. Rapid industrial development since World War II has provided nonagricultural employment

within the region and there has been a large migration to other regions as knowledge of job prospects was acquired. In addition, the relatively low level of farm income in the South has been a factor.

Proximity to a city appears to be an important factor in farm mobility since most of the moves by the farm population are relatively short. Of the 260,000 who moved from farm to nonfarm residence in five midwestern states in 1949-50, more than one-half did not move across a county line.

Industrial development in the smaller cities in the hinterland would probably help to achieve desirable shifts in the labor force. This would be especially significant since workers could shift to nonagricultural jobs and continue to live on their present farms. However, since many of these centers have not been favorable for manufacturing, their prospects for growth appear limited. To the extent that additional employment is not available in the areas having surplus labor, additional migration is needed. A large part will need to be fairly long moves.

In Iowa, for example, estimates made at the State University indicate that 2000 additional nonfarm jobs a year may be available to workers from the farm population in that state. However, about 13,000 workers will be available annually from the farm population. About one-third would result from a decline in farm labor force and two-thirds from the natural increase of the farm population. It is concluded that a net average of about 11,000 Iowans are under pressure each year to find employment in other states.

Several types of activities have been proposed to facilitate migration: better information on the availability of nonfarm jobs; assistance in job counseling, training and placement; assistance in the location of housing; and, in the long run, better education of the population in rural areas.

It is clear that the recent rate of decline in num-

continued



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State of Business, continued

ber of farm workers could continue for some time without detracting very much from the total output of the nation's farms.

About 30% of the 4.8 million farms in the United States, as enumerated in the Census of Agriculture in 1954, was described as "part-time" or "residential" farms. Included in these categories are farms on which the operators' major source of income is from work off the farm and for which the sales of agricultural commodities did not exceed \$1,200 (\$250 for residential farms). These farms provided only about 1% of the total agricultural commodities marketed in 1954.

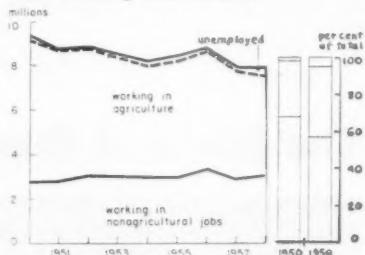
About 70% of the farms were classified as "commercial," where operators did not work off the farm more than 100 days during the year. Over 2 million of these, 43% of all farms, had gross sales of farm commodities of less than \$5000 and, as a group, provided 19% of the total farm products marketed. The annual output of farm commodities is variously estimated to exceed the amount that could be sold at current prices by 5 to 10% or more.

It is possible that farm population and farm labor force equivalent to that on about two-fifths of the nation's farms—60% of the "commercial" farms—could shift to nonagricultural employment without reducing farm output below the amount which could be sold commercially at reasonable prices.

Such a shift probably would enable many farmers to further exploit improved technology as they acquired the land released by the migrants.

Acceleration of net migration also would tend to boost income per capita of those deriving income primarily from agriculture simply because the farm population would be smaller. This is illustrated, for example, in the past decade. While the net income of farm operators averaged \$2547 in 1959, slightly higher than in 1950, this was possible because the num-

ber of farm operators declined 18% during the decade.



Farm residents with nonagricultural jobs are slowly increasing as the total labor force residing on farms declines.

Industry Briefs

Auto executives still predict 6½-million sales this year (including exports) and as good next year. This is well below the original 7-million goal but above last year's 6-million... U.S. trade balance is running at a favorable \$4 billion, thanks to Europe's boom. What happens competitively when European demand levels off and the strong, hungry European manufacturing capacity starts concentrating elsewhere?... Some 500 shareholders have accepted Studebaker-Packard's offer of a \$100 rebate on a new S-P car... Steel producers at Armco and Bethlehem are confident that new production techniques will make it economical for the appliance industry to switch to a one-coat, direct-on enameling sheet... On the eve of work rules bargaining, recent rail strikes have put new pressure on both unions and management to agree to a binding commission study on featherbedding... U.S. share of world air travel business dropped from 36% in 1951 to 32% through 1958... T. K. Glennan, chief of NASA, says that the first manned orbital flight in a U.S. space capsule "cannot be made before the end of 1961"... Minnesota's Supreme Court dealt fair trade a blow in that state by ruling the non-signer provision illegal... Directors of the Great Northern and Northern Pacific have voted to merge, forming the nation's largest rail network... The buying power of the average factory worker has risen 40% since World War II.

Adapted from a 1960 report by the Federal Reserve Bank of Chicago.



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protection



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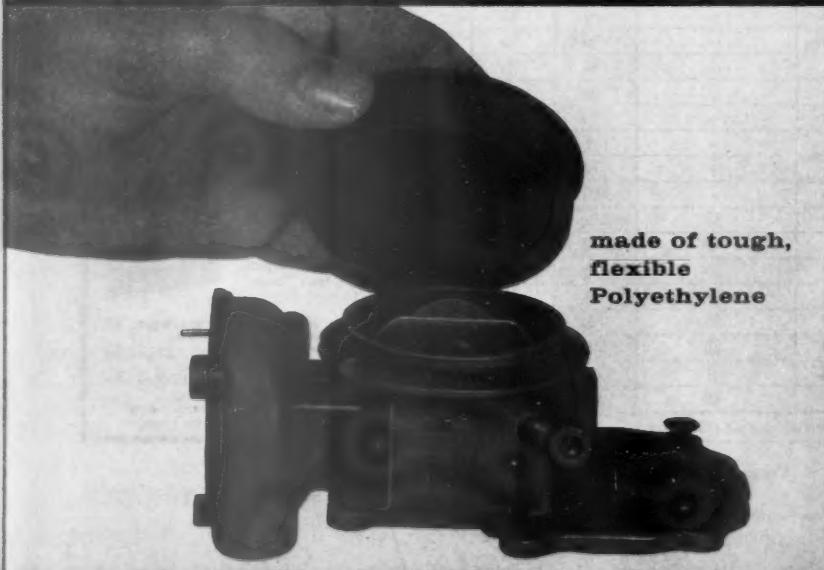
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Experience Keeps
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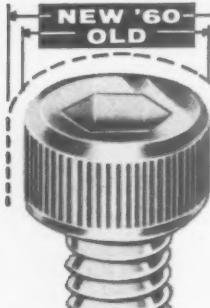
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Progress Edition

NEW '60* SERIES CAP SCREWS HAVE EXTRA HOLDING POWER

4 BIG EXTRA MONEY-SAVING ADVANTAGES WITH SETKO



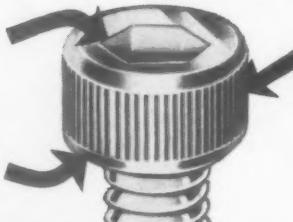
Compare the new head sizes of the new '60 series with the old '36 series and you'll see the many extra money saving advantages you get. For example: Broader bearing area under the head—often eliminates the need for washers. Bigger head sockets for greater tightening torque—give more holding power.

You get this extra size only where it counts—in the extra width of the head. (Head height remains unchanged.) In addition, you get longer service life and more re-use value when you specify Setko '60 series, Cold-Forged, Socket Head, Cap Screws.

LARGER HEAD SIZE PAYS OFF IN SAVINGS

BIGGER HEAD SOCKETS on many sizes take greater tightening torque without breakage or damage.

BROADER BEARING AREA under the head, distributes the load over a larger bearing area. Stops needless indenting of softer metals.



BETTER STRENGTH CHARACTERISTICS assure longer life—can be reapplied more times.

STAINLESS STEEL Cold-forged Cap Screws now available in many sizes.

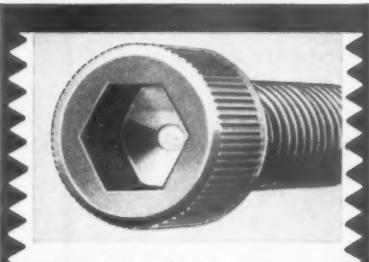
DATA CHART SHOWS INCREASED SIZES

*'36 series will continue to be available.

| Screw Size | Min. Head Dia. Inches | Bearing Area Min. Sq. In. | % Increase Bearing Area | Hex Key Size (Width Across Flats) | 1936 | 1960 |
|------------|--------------------------|------------------------------|----------------------------|---|------|------|
| # 2 | .136 | .134 | .006 | .006 | — | 1/16 |
| # 3 | .157 | .154 | .008 | .008 | — | 5/32 |
| # 4 | .178 | .176 | .011 | .011 | — | 5/32 |
| # 5 | .200 | .198 | .015 | .015 | — | 5/32 |
| # 6 | .221 | .218 | .019 | .019 | — | 5/32 |
| # 8 | .265 | .262 | .026 | .026 | — | 5/32 |
| #10 | .306 | .303 | .036 | .036 | — | 5/32 |
| 1/4 | .367 | .365 | .044 | .044 | — | 5/32 |
| 5/16 | .429 | .457 | .052 | .070 | 33 | 5/32 |
| 3/8 | .553 | .550 | .111 | .111 | — | 5/32 |
| 7/16 | .615 | .642 | .147 | .200 | 36 | 5/32 |
| 1/2 | .739 | .735 | .183 | .183 | — | 5/32 |
| 9/16 | .863 | .921 | .216 | .293 | 35 | 1/2 |
| 5/8 | .987 | 1.107 | .224 | .424 | 89 | 5/16 |
| 11/16 | 1.111 | 1.293 | .253 | .585 | 131 | 5/16 |
| 1 | 1.297 | 1.479 | .405 | .768 | 89 | 5/16 |

For dimensions on 36 series see latest Setko Catalog.

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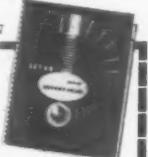
A Setko exclusive
"PERFECT-HOLE" SOCKETS
assure perfect key engagement!

You can exert maximum torque for total holding power because the hex socket is perfect. Permits perfect engagement of hex key against all of the bearing walls of the socket. Pressures exerted on the socket, are perfectly equalized for maximum driving power. Cap Screw life is extended and more re-applications are possible. Specially designed machinery and die tools, built to Setko specifications, are the reason for these cost-cutting, life-lengthening, money-saving, plus features.

Ask for free test samples

NEW FOLDER GIVES ALL THE FACTS

Contains complete specifications, dimensions and information about the new Setko '60 series of Cold-Forged, Socket-Head, Cap Screws. Fill in the coupon below, tear out and mail today. Ask for free test samples. Send us your requirements for advantageous quotations.

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Industry at Work



TAPPING SCREWS, LOCK NUTS PLAY KEY ROLE IN REVOLUTIONARY ALUMINUM HULL

When a revolutionary, new aluminum hull for pleasure craft is introduced at the 1961 Motor Boat Show in New York next January it will be through the joint engineering and manufacturing know-how of an aircraft firm and a 50-year builder of wooden boats.

United Marine, Inc., North Tonawanda, N.Y. will be offering the aluminum hull on many of its 1961 Richardson Cruisers. Manufacturing is being done by Avro Aircraft, Malton, Canada, designers of a unique aspect of flight known as the "Flying Saucer", now being developed for the U.S. Air Force.

Most significant feature of the new hull is that it is actually "planked" with aluminum strakes in the same manner as wood boats. These aluminum strakes are fastened to aluminum rib frames and the Geon seam stringers with stainless steel self-tapping screws and lock nuts.

In place of the conventional caulking which is synonymous with wood hull construction, a synthetic compound is used. On the inside of the hull, a heavy sound deadening material is applied. This insulation is so effective that, when the hull is thumped, a greater feeling of solidity is noted. There is also not the slightest telegraphing of sound or hammering as is the case with many other types of metal hulls.

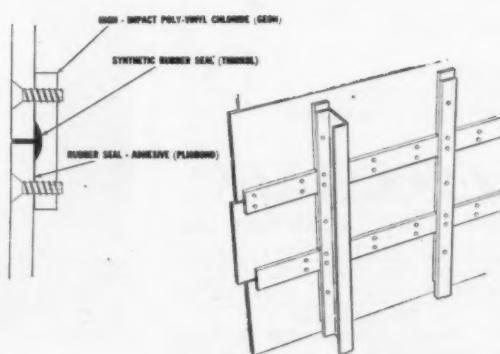
Should a plank need replacing because of damage, it is simply removed and replaced with a new one which can be ordered by catalog number. Close manufacturing tolerances make this procedure practical. Only a Phillips screwdriver and open end wrench are required for re-assembly.

In building the hull, an aluminum alloy furnished by Kaiser Aluminum and Chemical Corp., is used. Among its basic advantages are lightness of weight, greater toughness and durability and the elimination of the ill effects of salt water and the elements

continued



Aluminum has been adapted to the method of boat construction conventionally used in the manufacture of wooden craft.



This view shows typical jointing of planks and ribs in new aluminum boat hull.

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No long countdowns here. Allmetal stainless fasteners are stockpiled in advance—ready to go on your order. Fasteners in Commercial, AN, MS specs. You get fast delivery, precision quality, plus mass production economy when buying direct from stock.

Special fasteners also fabricated to your exact requirements on extremely short notice. Full range of raw materials assures prompt service. Simply send blueprint or specifications.

Pins • Bolts • Nuts • Screws (including slotted and Phillips—magnetic and non-magnetic) • Washers • Cotters • Rivets • Rods • Studs • etc.

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Industry at Work, continued

on hulls, reports the producer.

In addition to the sealant, an ingenious method of "keying" has been developed. A groove in the Geon seam stringer which strad-

dles and backs up the seam, allows the sealant to form a key—similar to that which plaster forms behind lath in home construction—and literally locks it in place.

ALLEGHENY LUDLUM ORDERS ALL-STAINLESS THUNDERBIRD

An all-stainless steel bodied Thunderbird has been custom made for Allegheny Ludlum Steel Corporation of their own steel. The body of the car is not colored nor protected in any way, and will not be protected from the elements during its lifetime.

From stainless steel taken from a regular production run, The Budd Company—fabricators of the Thunderbird bodies—made the parts for the automobile on regular production dies. The body was then turned over to the Ford Motor Company which completed and rolled the car from the regular assembly line at their Wixom plant near Detroit.

More than 1000 dies making more than 300 stainless steel parts were used in the fabrication of this car. A 300 horsepower engine with 4600 rpm is used. There is a seating capacity of four with an over-all length of 205.4-inches, over-all width of 77-inches and a wheelbase of 113-inches.

The body is made of Type 302 stainless steel with the trim being the standard Type 430 stainless steel. The body was given a special satin-smooth finish, similar to that given stainless steel used in skyscrapers and other architec-

tural applications. The trim work was handled in the same way as tons of the material is used on standard models of American automobiles; it has a mirror-finish.

AIR CONDITIONING UNITS POWERED BY SUN'S RAYS

When Stephen Foster wrote "The sun so hot I froze to death," he may have been forecasting the truth.

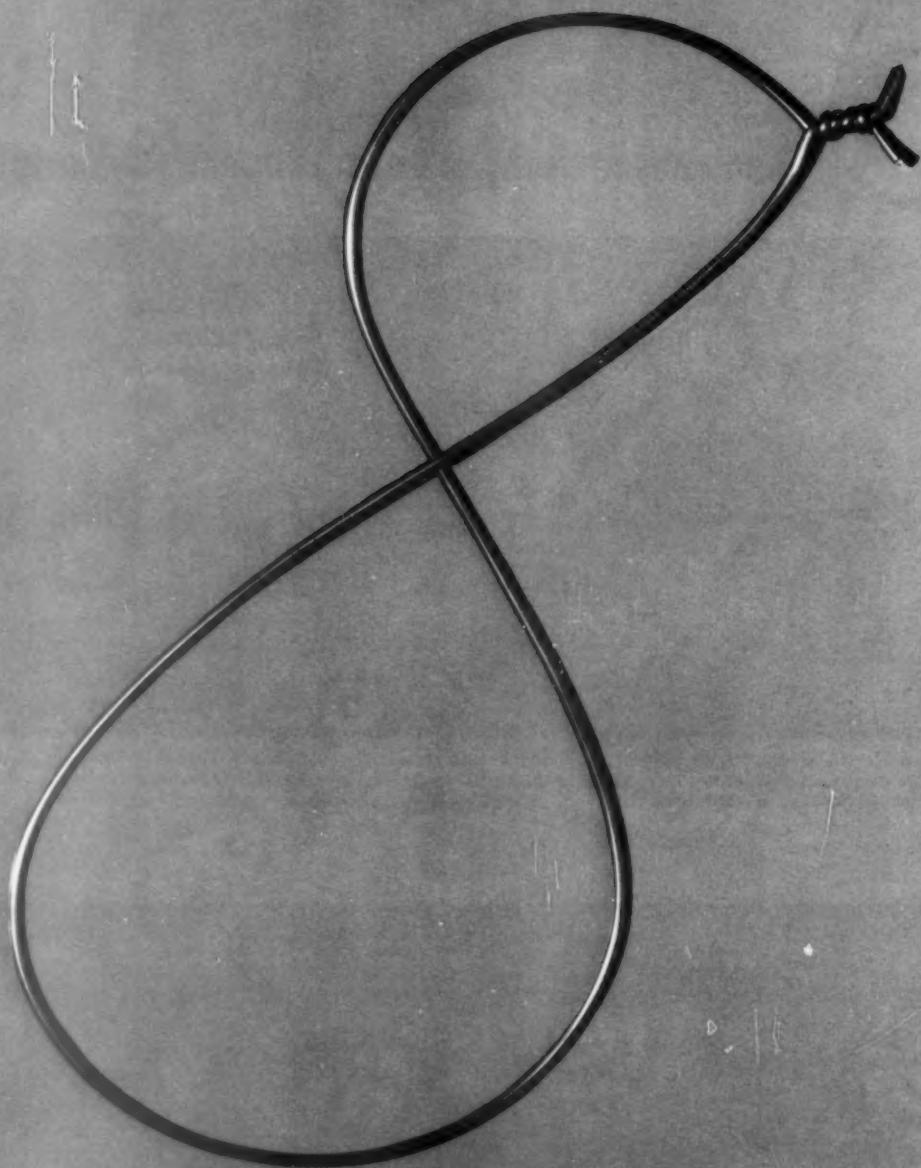
An experiment using the sun's heat to power air conditioning units was described by Melvin M. Eisenstadt, The Martin Company, Orlando, Florida, and Frank M. Flanigan and Erich A. Farber of the University of Florida. They said that using sunshine to power an air conditioning unit is a logical idea, since the hotter the sunshine, the more power it provides and the more heat a solar air conditioning system could remove. This provides peak efficiency when most needed.

The experimental unit they used works on much the same principle as a gas refrigerator, but instead of heat being supplied by a gas flame, it is supplied by the rays of the sun. The somewhat involved process by which heat

continued



An all-stainless steel bodied automobile makes its debut! The body was stamped from standard 1960 Thunderbird dies using the same gage material in stainless as it would in mild steel.



**good reasons
why it pays to specify
American Steel & Wire
for all of your
stainless steel wire needs**

8

good reasons why it pays to specify American Steel



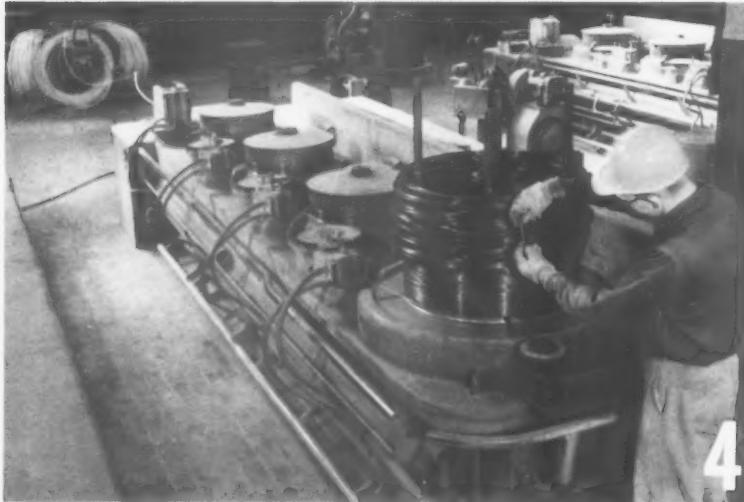
1

By using modern welding techniques, we can turn out continuous coil weights as heavy as 500 pounds to suit your particular needs. Heavier coil weights reduce down time on your machines, speed handling of material.



2

The latest in controlled annealing methods enable us to produce uniform properties in stainless wire that assure consistent performance on your equipment and in your product.



4

To insure the gage of your stainless is consistent from end to end, it's checked constantly during the continuous drawing process. ASW's wide range of modern, precision drawing machines can turn out everything you need in type, size and finish.



5

After drawing, the wire is again inspected to make certain that the gage and finish are exactly as specified.

&

Up-
clean
clean
to m

During
size,
tensile
to ma
Such

This mark tells you a product is made of modern, dependable Steel.

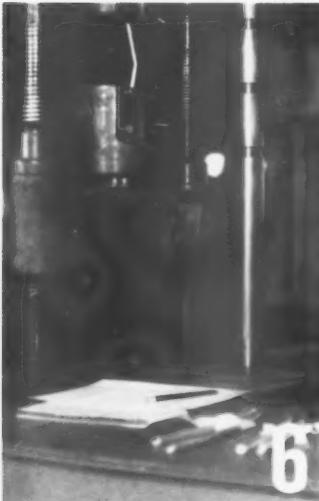


& Wire for all of your stainless steel wire needs



3

Up-to-date salt and acid bath techniques and equipment guarantee the smooth, clean wire surface so important to the finished quality of your product. After cleaning, coatings such as this electrolytic copper coating are often applied to make your job of fabrication easier.



To insure supply and fast delivery, we stock 300 to 400 tons of cold heading stainless wire in addition to a heavy tonnage of other stainless steel wire items at all times.

During processing and at finished size, our stainless wire is tested for tensile strength and other properties to make sure it meets specifications. Such tight control insures quality.

8

Our stainless steel wire service is second to none. In addition to our regular salesmen, we have special Stainless Steel representatives in your area who have both engineering and mill backgrounds. They know metals, they know production. Their assistance can be invaluable to you in solving the really tough ones. Call your nearest ASW Sales Office today. If you like, we'll have a man out to see you at your convenience. Or if you prefer, write American Steel & Wire, Dept. 0389, 614 Superior Avenue, N.W., Cleveland 13, Ohio.



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Snap-on

MIDGET TOOLS

speed assembly of tiny components



159-TM-B Complete Midget Utility Set
1/4-in. square drive — 59 tools in strong metal box

This SNAP-ON 1/4-in. square drive set gives you a practical assortment of tools for small, intricate product assembly or maintenance work — electronic components, appliances, communication equipment, etc.

The 59-tool set includes deep hexagon and standard hexagon sockets ranging from 1/8 in. to 1/2 in.; square sockets; regular tip, Phillips, clutch-type and hex head screwdrivers; plus ratchets and a wide assortment of other handles and adaptors.

The fine quality and precision machining common to all SNAP-ON tools is particularly important in these tiny units. Socket openings, for example, are machined to extremely close tolerances to fit snugly and surely over tiny nuts and bolts without slipping. Driver bits likewise are machined to close tolerances and fit well into screw recesses to avoid gouging of screw heads.

The result is faster work output, far less rejects because of bolt or screw damage. And, because tough SNAP-ON tools last longer, they cost less in the long run.

SETS ASSEMBLED TO ORDER

The above set can be modified to meet your exact needs, or sets of specially selected Midget socket wrenches and other small tools can be developed to fit your exact requirements. Available, too, are Midget industrial sockets in black finish for use on power nut runners. Your SNAP-ON representative will be happy to give you full details. He offers a complete range of hand and bench tools for all industrial needs. Call your nearest branch or write us for new industrial catalog.

FOR ALL INDUSTRY
SNAP-ON TOOLS

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Industry Work, continued

can be used to cool things is called "refrigeration by absorption" and relies on a mixture of water and ammonia gas which is alternately separated and remixed. In practice, heat from the sun would be gathered by a "flat plate collector," which can be installed on the roof or near a building. Such collectors are relatively simple and inexpensive.

One problem is finding the concentration of ammonia to water which would work best when the heat source is around 140 to 180°F, much lower than the temperatures of a gas flame usually used in such systems, but easily obtained with current solar heaters. They concluded that solar powered air conditioners are technically feasible, if high concentrations of ammonia, from 40 to 70%, are used in the absorption system.

USE FUSED SILICA CASTS FOR BRAZING HONEYCOMB



Final inspection is being made of a plaster mold in which the contoured ceramic cast for the brazing process will be made.

Fused silica casts for brazing complex contoured stainless steel honeycomb panels have been successfully tested at Boeing Airplane Company's Wichita, Kan., Division. The new concept will, in most cases, eliminate the much costlier use of machined graphite fixtures with which only the simplest contours have been possible.

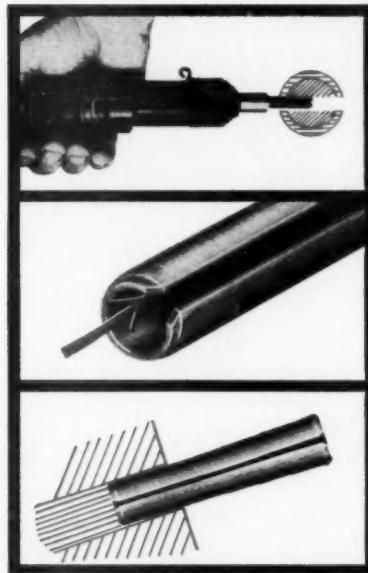
In addition, greater production speed and versatility will be possible since catastrophic oxidation, the major drawback to using machined graphite, can be eliminated.

Rollpin won't mushroom or telescope

There are no installation or removal problems with Rollpins. Because of their column strength they can be readily driven with a hammer, removed with a punch without bending or collapsing. Of course production line tooling such as an arbor press, a pneumatic hammer . . . even a hand riveter . . . is ideal for Rollpin insertion.

Rollpin won't damage or enlarge hole

With smoothly chamfered ends providing an easy lead-in, Rollpin is compressed into complete conformity with the shape of the hole. The exclusive, v-shaped, coped corner design eliminates possibility of damage to the hole walls. They prevent any possible scoring action as the pin is driven and insures uniform insertion and removal characteristics. The benefit to you: the same pin can be reused in the same hole.



ONLY ROLLPIN OVERCOMES ALL THESE FASTENING PROBLEMS!

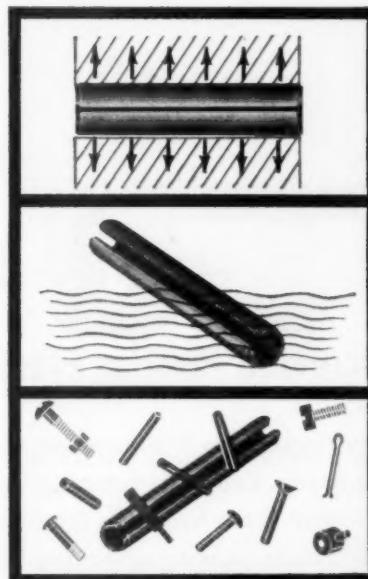
Rollpin exerts EVEN pressure

In some fasteners, only a portion of the fastener shaft does the actual holding. Rollpin, however, exerts a uniform pressure around the entire inside surface of the hole—giving you maximum holding power and superior resistance to vibration.

Split tubular construction assures uniformity of heat treatment that is difficult to obtain with spiral types of pins; there is an even plating "throw" inside the pin as well as outside for superior corrosion protection.

ONE TYPE of Rollpin does EVERY TYPE of job

Versatile Rollpins will replace at least 12 different types of fasteners. Every Rollpin can be hopper-fed, can be installed with a single operation. They are available, from stock, in a wide range of lengths and in diameters from 1/16" to 1/2". Manufactured from carbon or corrosion resistant steels and beryllium copper.



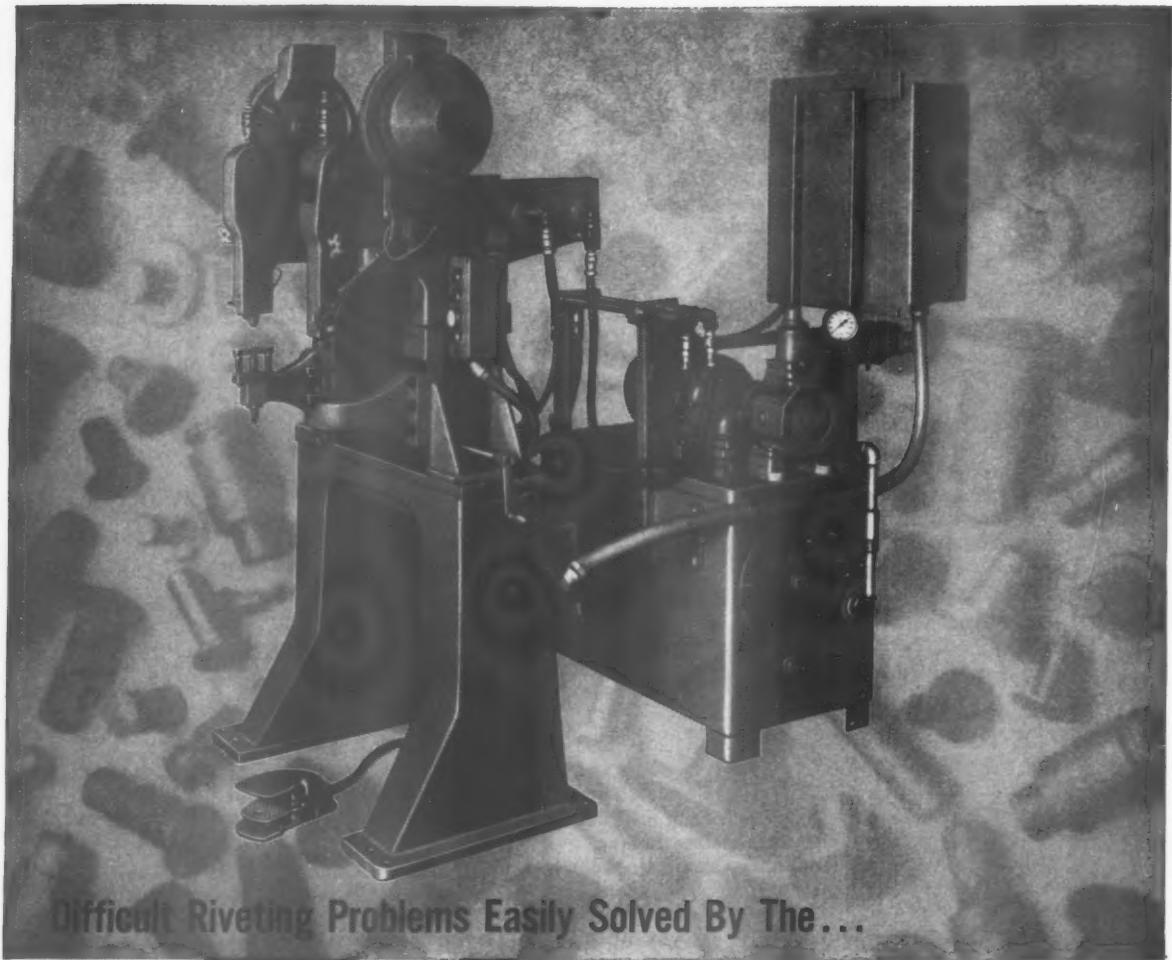
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CORPORATION OF AMERICA**

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Difficult Riveting Problems Easily Solved By The...

New **T-J** HYDRAULIC DUAL RIVITOR

With Increased Riveting Production • Quality • Versatility

Added recently to the versatile T-J line of unit and production line riveting and clinching machines is the new Hydraulic Dual Rivitor. The Model HDR will set two $\frac{1}{4}$ " solid steel rivets at once with adjustable spacing from 1- $\frac{1}{2}$ " to 18" maximum, center to center, being fed from 10' hoppers. Operating cycle is approximately .8 second, at 420 P.S.I. oil pressure furnished from a hydraulic power unit with maximum of 1000 P.S.I. output. For complete specifications write to The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Michigan for Bulletin HDR-4-59.

For information on other
T-J Rivitors and Clinchers
write for Bulletin No. 555.

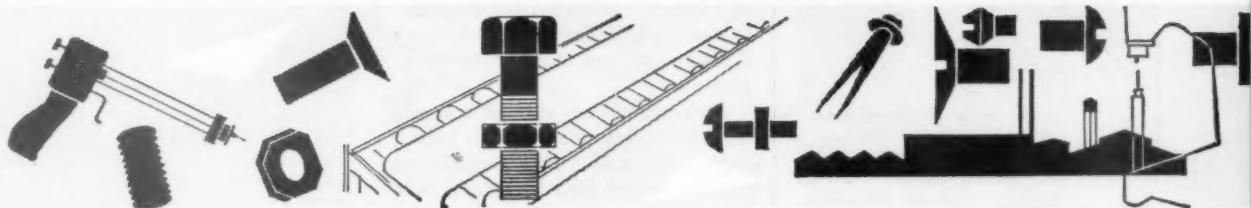


TOMKINS-JOHNSON

RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

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Assembly and Fastening Ideas

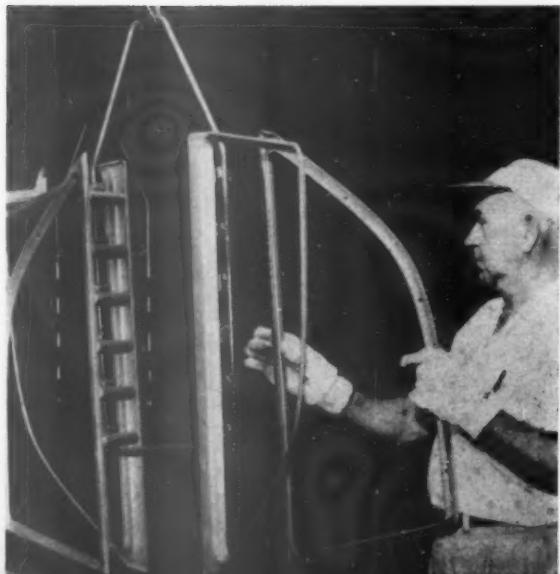
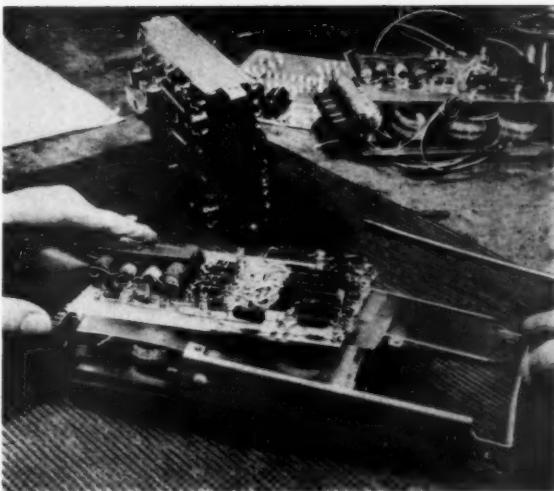


PRE-POTTING PREVENTS CONNECTOR FOULING

A new method of preventing fouling of connectors by potting resin leakage has been developed by the industrial engineering department of Librascope Division—General Precision, Inc., Glendale, Calif.

In potted equipment, such as a plug-in subassembly used in high-speed digital computation systems, the liquid epoxy potting resin often leaked through the connector, fouling pins. The problem was solved by pre-potting the terminal side of the connectors with a foamed elastomer before the unit is assembled.

According to George Clark, manager of industrial engineering, the "pad" of foamed elastomer serves a dual function. It not only prevents leakage of the epoxy resin, but also provides a non-rigid installation for the connector terminals to prevent shorts or arc-over.



CHRYSLER USES MAGNETIC CONVEYOR RACK

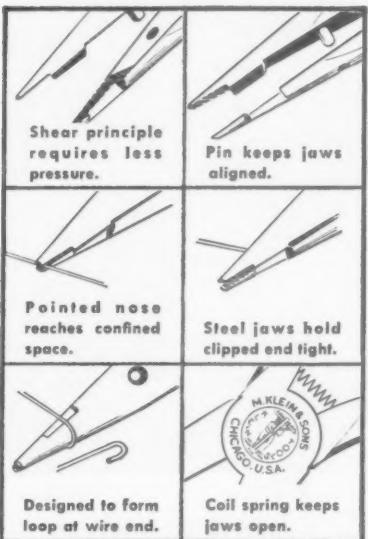
What might be a work of modern metal sculpturing is really trim parts hanging on a magnetic rack at a Chrysler Corporation assembly plant. The magnets have taken the place of several different work-holding devices on conveyor lines through paint operations.

By using magnets, it is possible to quickly hang parts on the rack. The parts range in size from small trim mouldings to 36-pound floor pans. Formerly, 77 different styles of hangers were needed to handle the various parts. The permanent magnets are welded onto a rectangular frame—24 magnets to a frame. Built according to Chrysler specifications, the magnets handle up to 38,000 parts per day in each of the assembly plants. A major advantage of the magnets is their ability to support parts on any point of contact.

continued



JUST THE PLIER FOR ELECTRONIC USE



Here is a plier specially designed for electronic use. It will fit into confined space and steel jaws hold clipped end of sheared wire firmly... nothing to wear out.

The shear blade is at an angle of 15 degrees (the standard angle of regular diagonal pliers). Shear principle assures smooth, continuous action without snap, preventing shock which might damage transistors or delicate components. For use with bare wire up to 18 gauge.

**See your electronic supply house or
WRITE FOR CATALOG 101-A**

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24

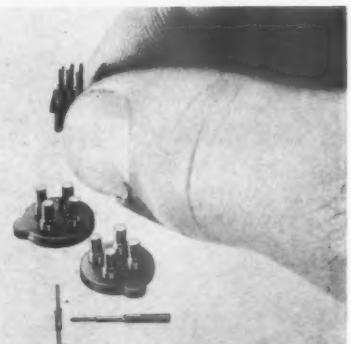
Assembly and Fastening Ideas, continued

PRINTED CIRCUIT SOCKETS HOLD LEAD WIRES TO .004"

Lead wires as small as .004" in diameter are accepted and held securely in miniature sockets manufactured by Omega Precision, Inc., Azusa, California. Sockets are mounted in printed circuit boards by staking or dip soldering, which eliminates hand soldering operations, and possible heat damage to semiconductor components.

Accommodating diodes, transistors, subminiature vacuum tubes, capacitors and resistors, these sockets retain their holding power throughout many insertions and withdrawals. Flexibility in installing miniature plug-in components is greatly increased.

The Tran-Grip embodies a new design in a closed-entry, multiple-spring, contact-gripping device. A beryllium copper spring shaped



Miniature sockets, which accept lead wires in printed circuits, are also designed to be used as connectors in conjunction with a series of coordinated pin designs.

like an hour glass grips the lead securely from 2 sides. The spring is virtually immune to damage in that it will not admit too large a lead and is self-aligning when admitting the lead.

CB & Q SWITCHES TO HIGH STRENGTH BOLTS FOR RAIL BRIDGE

Changing erection plans in mid-stream, Bethlehem Steel Company will complete the partially constructed Chicago Burlington & Quincy Railroad Bridge in Quincy, Ill., using high strength bolts instead of field rivets.

The 2500-ft.-long bridge will become the first major railroad crossing to be high-strength bolted. About 140,000 bolts will be required to complete the final two-thirds of the bridge.

Bethlehem had requested permission to complete the structure

with high strength bolts to keep the project on schedule. Bethlehem was finding it impossible to secure a sufficient number of experienced riveting gangs from the Quincy area—or from anywhere else.

Highway bridges have been designed as high-strength bolted structures for several years. Although the rumble of a railroad train exerts a loading effect different from that of a speeding car or truck, Bethlehem obtained ap-

continued



The first major railroad bridge on which high-strength bolts are being used is being erected in Quincy, Illinois.



"I Like Bethlehem bolts so much I built this just for fun!"

You'll like Bethlehem bolts, too. They're tops in quality. All sizes and types of carriage, lag, and machine bolts and nuts are available for quick delivery.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

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3 WAYS TO PERMANENT THREADS - IN ANY MATERIAL!

For original design — production salvage and "on-the-job" thread repairs — use Heli-Coil® Stainless Steel Wire Screw Thread Inserts.



HELI-COIL Standard Insert for stronger, smoother, lifetime threads

Permanently protects threads against wear, stripping, corrosion, galling, seizing, vibration, and shock. Made of 18-8 stainless steel wire, this precision-formed Heli-Coil Insert has a tensile strength of approximately 200,000 psi. Conforms to military standards and all commercial and industrial thread forms.



HELI-COIL Screw-Lock Insert eliminates lock wiring and lock nuts

This one-piece wire Screw-Lock Insert provides all the thread protection of the Screw-Thread Insert, PLUS an exclusive resilient *internal* locking feature that eliminates clumsy protruding lock nuts, lock wiring and other supplementary locking devices. It saves cost, space and weight — permits simple streamlined design in standard bosses. Meets military and N.A.S. specifications for locking torque and vibration.



HELI-COIL Shop-pack for all "on-the-job" thread repairs

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Approval for bolting from Howard, Needles, Tammen and Bergendoff, consulting engineers for the CB&Q project.

PRESS-STAKE TOOL BOOSTS PRODUCTION 150 PERCENT

By designing a tool to combine press fit and stake operations, Cramer Controls Corp., Centerbrook, Conn., increased production by 150%.



Before Cramer developed the Pressstaker, typical production volume on a standard timer mechanism was 600 units a month for 18 workers; now, with the new tool, production has increased to 900 units a month with only 11 workers. Methods throughout the plant were revamped and each assembly area is now equipped with primary components, a chart indicating step-by-step procedure and all interchangeable tools needed.

Cramers' tool's staking-point shift is less than .001", while the uniform staking pressure is adjustable—without gaps—from a gentle tap to a blow which will produce a deeper stake penetration than a 1-ton hydraulic staker in similar material.

ASSEMBLE, WELD ELECTRIC PARTS AUTOMATICALLY

Representative of the sort of automated equipment being adopted by electrical manufacturers are two Precision Welder and Flexopress bench welders at the Bryant Electric Co. Div. of Westinghouse Electric Corp. These 30 kva units in the Bridgeport, Conn., plant are both equipped with six-station Geneva dial feeds. Parts are drawn from hoppers, assembled, welded, formed in one case, and ejected automatically.



Two support ears to a yoke for a duplex electrical outlet are welded at production rates to 2000 assemblies per hour.

matically at a rate of 1500 to 2000 assemblies per hour.

One dual head AVB-3 machine welds support ears onto the ends of two styles of yokes for duplex electrical outlets. The other series welds spring grounding contacts onto similar yokes, and performs a forming operation on one style of yoke. The fixtures on the dial tables are designed to accept two styles of yokes without alteration.

SPECIFY LOCK BOLTS FOR FIRST ALUM. HOPPER CAR

Industry's first all-aluminum hopper car being built by Magor Car Corporation of Clifton, N.J., uses lock bolt fasteners to join many structural assemblies.



Huckbolt pin is inserted through mating holes in vertical post and top-line rail to be joined.

Conventional aluminum bucked rivets, driven hot, presented a problem due to rapid heat transfer and work hardening. To drive conventional rivets of 6061-T4 aluminum, they must be heated and held at 1020°F, plus or minus 30°. Rapid heat transfer in the rivet material makes close control of temperature difficult. In addition, the conventional rivets tended to work harden during bucking.

Two-man crews are used to install the lock bolts, compared with a three-man crew for hot bucked aluminum rivets.

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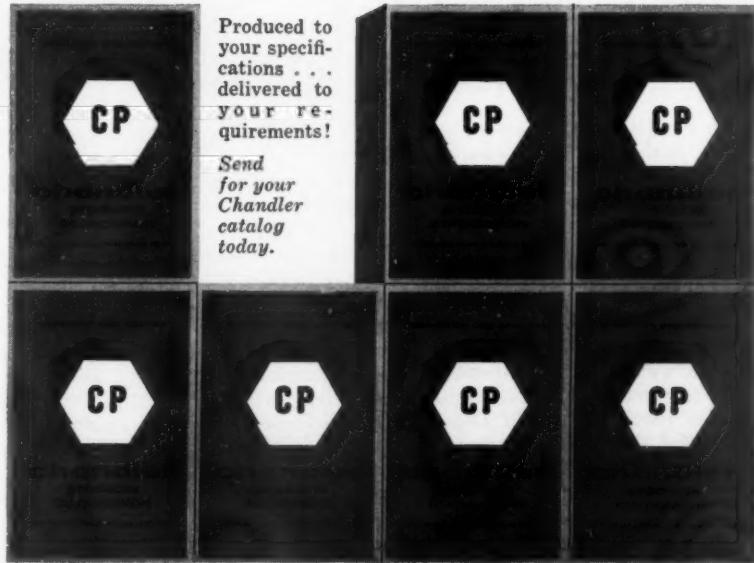


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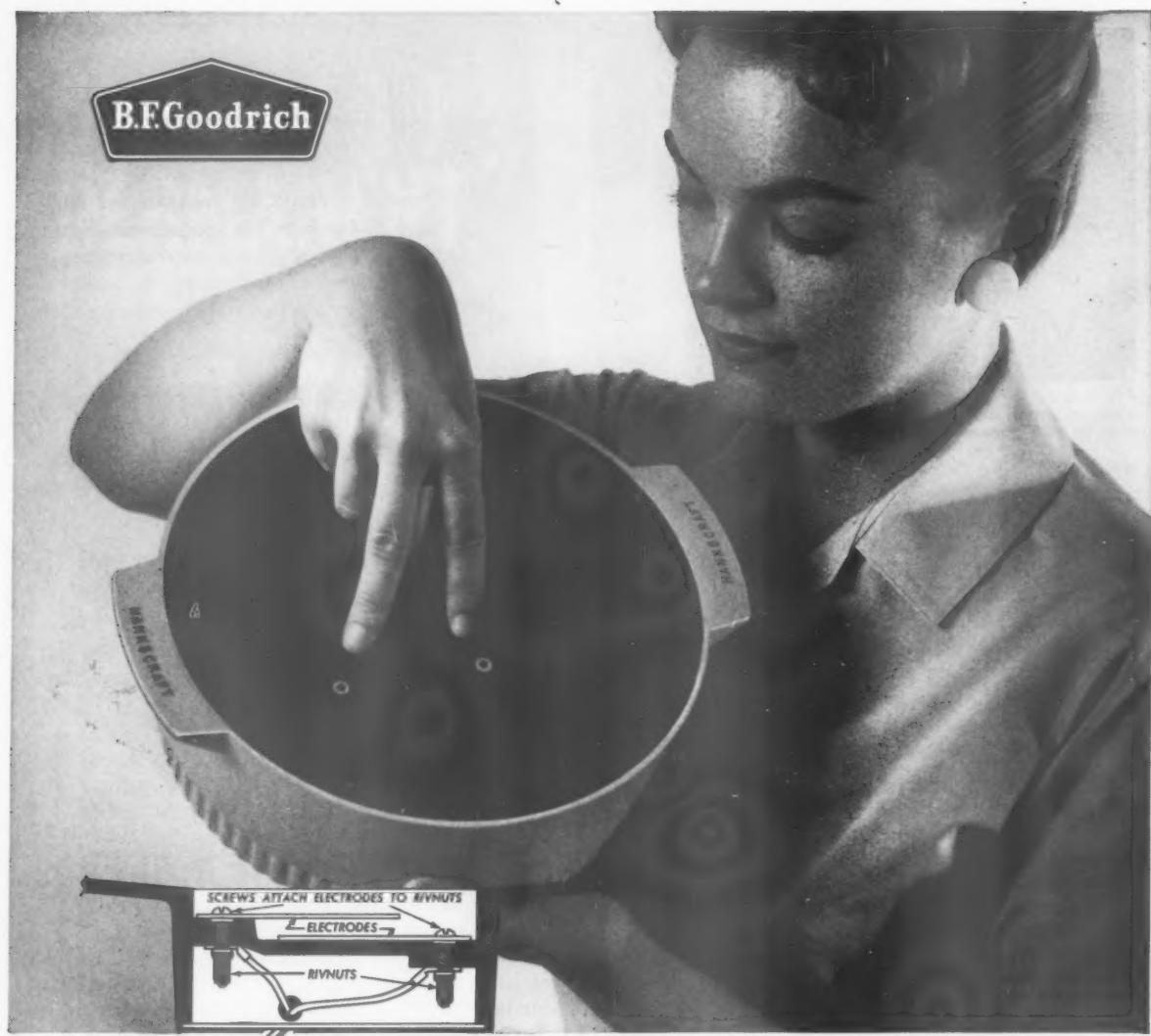


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B.F.Goodrich



These two RIVNUTS® permitted redesign to eliminate parts; speed assembly

Here's why Hanksraft Company turned to B.F. Goodrich RIVNUTS when they streamlined design, production and appearance of the Model 200A Baby Bottle Sterilizer.

Before RIVNUTS, the electrodes and terminals were fastened to a large porcelain "dish" by screws and nuts. Four gaskets were required to prevent water leakage. A metal screw-on cap had to be fitted underneath the porcelain "dish".

RIVNUTS eliminate all these cumbersome pieces. Installed in the simplified plastic base, RIVNUTS secure terminals, provide water-tight nut plates. Two screws attach electrodes—and the unit is complete.

You can get B.F. Goodrich RIVNUTS in thread sizes 4-40 to $\frac{1}{2}$ "-13 with flat or counter-sunk heads. Rivnuts have hundreds of applications in appliances, electronic equipment, machinery and structures. Special types are available for aircraft and missiles.

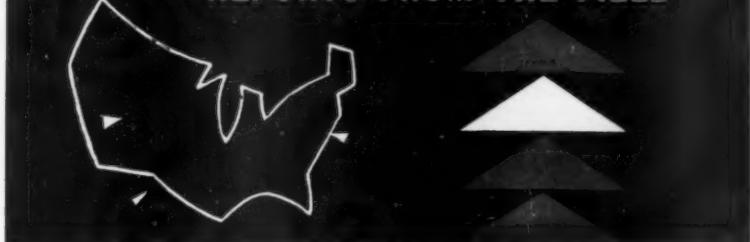
Write now for free copy of Rivnut Design Data. Better yet, send us a sketch of your toughest fastening problem. Dept. AE-11, B.F. Goodrich Aviation Products, a division of The B.F. Goodrich Company, Akron, Ohio.



B.F.Goodrich *Rivnuts*

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REPORTS FROM THE FIELD



HOLLAENDER CUTS SET SCREW DRIVING COSTS IN HALF WITH AUTOMATIC UNIT

An automatic set screw driver with broad-spectrum adaptability has keyed a one-two-three automation program by Hollaender Mfg. Co., Cincinnati, Ohio.

As a practical means for initially mechanizing assembly of "square" set screws into its Nu-Rail and Speed-Rail pipe fittings, Hollaender found the automatic driver cut insertion costs in half. The square sets, with diameter equal to length, are a tough proposition for automatic handling. The machine saved \$1500 the first year alone—and savings tripled when a second machine was added.

These handled 90% of the work. Shipments were speeded by 30%, despite a 20% increase in volume of work handled.

But most important, the ma-

chines—Standard Pressed Steel Company's Setomatics—paved the way (by licking the assembly bottleneck) for further steps to automation. Step two, now being effected with installation of rotary tables, is to speed up preliminary production operations by integrating them with assembly. The four-station tables will move raw castings through drilling and tapping, as well as assembly stages. These are expected to slash finishing costs another two-thirds.

Later, when volume justifies automatic feeding of castings, the machine is capable of full automation insertion rates to 2500 screws per hour. Because of the variety of castings handled, an operator now positions castings manually for insertion.

Uniform depth of insertion has

been a bonus advantage, Hollaender says, with payoffs in reduced inspection needs and better customer relations.

Formerly, Hollaender had to back out as many as 50-60% to insure proper clearance for the pipe that would later be assembled into the fittings. Screws slipping past inspection either too deep or too loose (with risk of loss during transit in the latter case) were customer irritants.

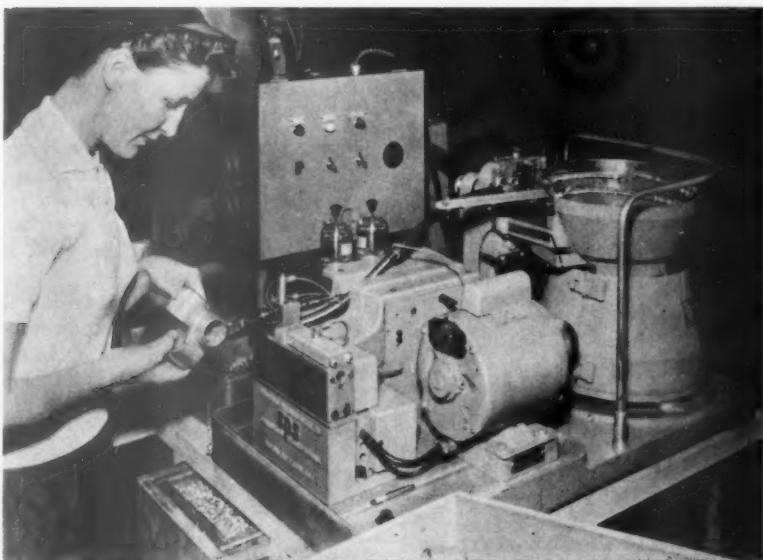
New flexibility in adapting production assembly operations to increased or fluctuating demands, without escalator hiring and firing, has been an added benefit. Hollaender is now using its automated screw inserters on less than full-shift operation, with an operator hand-feeding the various styles of fittings. Screw insertions vary from 750 to 1200 screws per hour. The machine, however, is capable of round-the-clock insertions at rates to 2500 screws per hour.

CLIP SIMPLIFIES FASTENING OF AUTO MOULDING

Although 1961 cars are now rolling off the assembly line, '62 models are already being readied. And one of the early "bugs" which had bothered design engineers of a leading auto manufacturer was the method of fastening a decorative chrome hood moulding.

A special 2-part moulding fastener, designed by the George K. Garrett Co., Inc., as a shallow fastener of a simplified design was specified.

Formed with two integrated



Screws are automatically driven to pre-set torque at Hollaender Mfg. Co.

**the versatile, NEW
ELECTRO PUNCH
can increase your
light assembly
production as
much as 100%**



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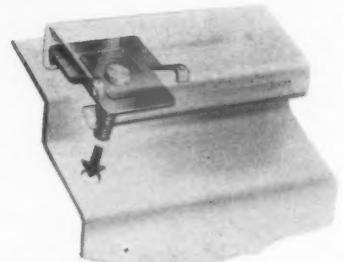
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Field Reports, continued

points of contact, the dimpled spring legs permitted easy and secure positioning of the clip within the moulding, speeding assembly.

Also, the embossed fastener panel section proved to provide the strength required (without being weakened) when the entire unit was tightly bolted.

Preliminary estimates showed 50% savings for the special fas-



tener over alternatively proposed fasteners.

AUTOMATIC UNIT, PREFORM RINGS CUT BRAZING TIME

One of the large manufacturers of heat exchangers was able to trace his maintenance trouble to brazed joints. The brazing alloy was fed in by hand, and no one could say, looking at the joint, whether it was a sound solid connection. (Operating pressures ranged up to 250 psi.) Perhaps the alloy had "flowed" unevenly, leaving some joints imperfect below the surface.

The manufacturer called in engineers at Induction Heating Corporation, whose installation not only solved the problem but also speeded production. Moreover, work that had to be performed formerly by highly skilled artisans now is done by unskilled

labor. In addition, the new Ther-Monic brazing machine paid for itself within a year of installation.

IHC men suggested that a 120-deg. chamfer would be needed, which would contain the silver alloy around the joint with a slight fillet. The tubes themselves are of copper, the headers of steel, and the fins of aluminum.

The substantial saving in silver alloy is brought about by using preformed silver rings of fixed quantity.

A 3-tube header 36" long, used to require 10 minutes of skillful effort by experienced operators. Today the same header made by the new process takes 2 minutes, reports the company.

STUD WELDING SIMPLIFIES COVER PLATE FASTENING

Savings of a dollar per installed fastener—that was the result when small end-welded studs were used in an application at the Galion Iron Works and Mfg. Co., Galion, Ohio.

Whereas the studs cost six cents

apiece, the fastening method they replaced came to something over a dollar per unit, according to the plant superintendent.

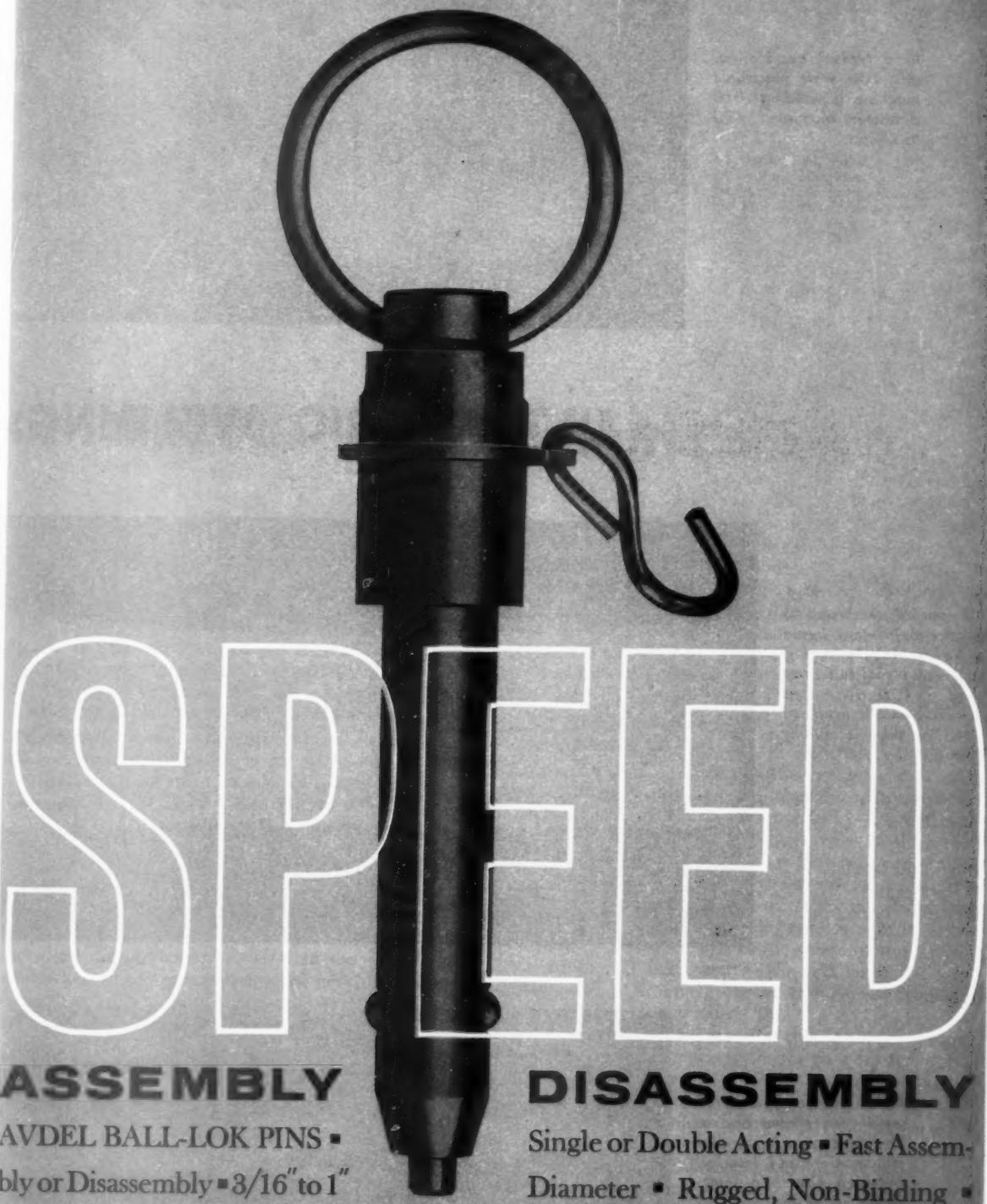
Ten threaded studs, $\frac{3}{8}$ " in diameter and 1" long, are now used to secure each of two gasketed cover plates on Galion's 12-ton pneumatic tire roller, used for compacting construction surfaces. The studs are welded through a simple template at the rate of four per minute with the Nelson NS-10 stud welding gun.

Formerly, welding pads had to be manually arc welded to provide tap depth, since the roller's frame is only $\frac{1}{4}$ " thick. Then the pads were drilled and tapped for cap screws.

Stud welding eliminated the fabrication of the welding pad, cost of the steel, hand welding the pad, and drilling and tapping. Studs will also make it easier to service.



Studs are welded through a simple template at the rate of four per minute.



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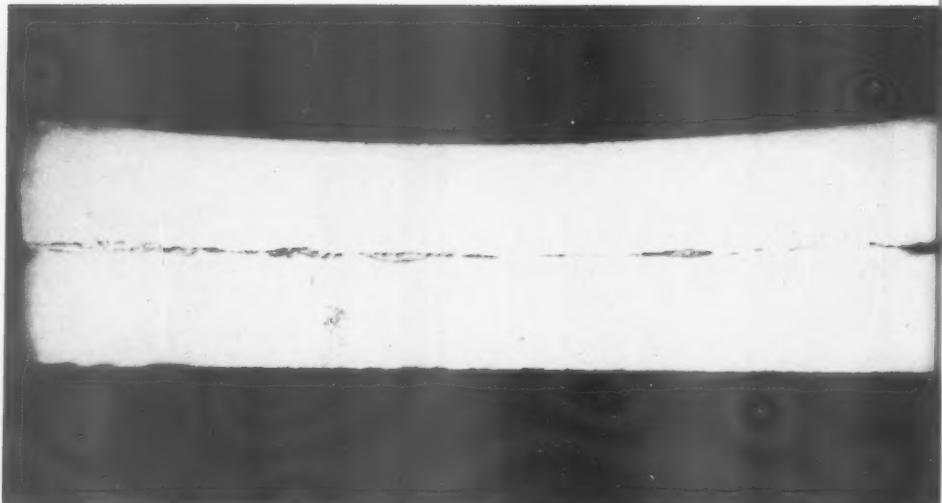
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In a typical application, this 100 watt ultrasonic machine is welding .010 diameter aluminum wire to silicon.



ULTRASONIC WELDING:

50X partial cross-section of ultrasonic weld made to hermetically seal a .010 wall nickel tube and bond a .010 diameter aluminum wire to inside of tube. The tube is initially .060 o.d. by .040 i.d.



250X view of section of weld zone shown above. The dark area is the aluminum wire that is bonded between the two interfaces of inside wall of tube.



Ultrasonic welding, one of the newer joining techniques, is growing in popularity. However, to be used to best advantage, five variables must be controlled.



by George W. Fabel
Mechanical Engineer
Semiconductor Products Dept.
General Electric Company
Auburn, New York

OPTIMIZING THE VARIABLES

Of the newer techniques in joining metals, ultrasonic welding is one with many possibilities not heretofore practicable with other types of welding. One of its major advantages is the ability to break down the oxide coating on metals by virtue of the friction or scrubbing action in the weld area. Other advantages are the ability to weld very thin foil or fine wire to very thick sections, low heat generation, no splatter, and no appreciable deformation.

There are varied opinions on just what takes place in the weld zone. It should suffice to say that an ultrasonic weld constitutes a solid state molecular bond at the interfaces. This is caused by friction developed by vibratory energy delivered to one piece of metal while holding the other stationary. Inasmuch as the heat generated by friction is of very low magnitude, i.e. usually in the order of 300° to 500°F, it is questionable as to whether or not a recrystallization takes place in the weld zone. The important thing, however, is that the interfacial bond when properly consummated provides a bond strength equal to that of the parent stock.

Technically speaking, the definition of ultrasonic is frequencies above those which may be heard by the human ear. Although inconsequential to the theory of ultrasonic welding the so-called ultrasonic energy does not necessarily have to be in the ultrasonic range. Actually, frequencies in the order of 5,000 cycles per second or lower have been used successfully for welding. On the other hand, frequencies of 100,000 cycles per second or more have been used. In general, it is believed that thinner materials respond better to higher frequencies and thicker materials to lower frequencies.

One of the disadvantages of ultrasonic welding is the number of variables involved and the possible combinations thereof. The variables are tip geometry, frequency, power, time, and clamping force. Each one of these must be fixed in order to bring

about an optimum weld that can be consistently repeated with a given weldment.

Unfortunately, when the type of weldment is changed, a new set of conditions will apply. It is therefore important that their relationship to each other be understood. To bring order out of chaos it becomes mandatory that a methodical approach be used in fixing the variables. A more detailed explanation of each variable follows.

TIP GEOMETRY

It is the welding tip, in the final analysis, that must transfer the energy from the transducer to the weldment. Because of this, it must be of correct configuration to transfer maximum energy to the work. It must also be of such design that it is compatible with the frequency range of the welder. For example, slight changes in the tip contour can cause the coupling system to be such that its resonant frequency is no longer within the range of the oscillator tuning. If this occurs, the efficiency falls off with little or no energy being transferred from the transducer to the welding tip.

No attempt will be made in this article to go into the calculations necessary to design a tip for a specific type of weldment and for a given frequency range. It is assumed that the tip to be used has been designed for the welder and is capable of performing the type of weld that is being attempted.

Before trying to eliminate any other variable, the tip design must first be fixed. It may be said that the optimum weld tip is that which will resonate within the frequency range of the welder and under this condition transfer the maximum energy from the transducer to the weldment.

FREQUENCY

It has been established that ultrasonic welding can be accomplished over a broad range of frequencies. For a particular welder the frequency range will

continued

Ultrasonic Welding, continued

be fixed by virtue of transducer design and bandwidth of the oscillator. Oscillator tuning is provided for the purpose of matching the oscillator frequency to the resonant frequency of the transducer and coupling system.

Whenever tip configuration is changed, the resonant frequency of the coupling system will change. Therefore, the oscillator must be retuned to match this frequency. The coupling system is also subject to slight changes in frequency with variation in clamping force and power. For optimum performance, the oscillator frequency should be established under the actual weld conditions. It should be retuned each time a change is made in either clamping force or power.

POWER AND TIME

Power and time are the two variables that must be optimized together. A power adjustment can be compensated by a time adjustment and vice versa; thereby, a good weld condition may exist over a limited range in both power and time. The optimum power and time compromise is more fully explained in Step 6 under "Welding Procedure."

CLAMPING FORCE

The ideal clamping force to be used for any weld application is that force which transmits the maximum amount of energy from the welding tip to the weldment under a favorable power and time combination that produces a good weld.

With a given power and time combination, an increase or decrease in clamping force from optimum will result in loss of energy transfer. In the case of less than optimum force some of this loss may be regained by an increase in power. If the clamping force is increased above optimum, all of the lost energy can be regained provided sufficient power is available to overcome the increased clamping force. In either case, power is wasted to compensate for incorrect clamping force. More important, the use of increased power may cause excessive deformation of the weldment. For these reasons, it is desirable that clamping force be optimized.

Note: The range of clamping force for the welder should be measured and sufficient data taken to plot the force for each setting throughout the range of clamping. Knowledge of the clamping force at each setting is desirable when attempting to optimize this variable.

WELDING PROCEDURE

Since it is impossible to establish the ideal frequency, power, time and clamping force without a certain amount of experimentation, a methodical approach should be made to each welding application. This is necessary in order to intelligently ascertain whether the weldment is feasible and, if so, to establish a procedure that can be followed in order that each variable may be optimized.

In general, the following procedure may be employed to determine feasibility and provide a step by step method of optimizing all of the variables.

This procedure should be applicable regardless of the weldment or the rating and capacity of the ultrasonic welder being used.

1. Set the time cycle for maximum length of pulse permitted by the welding machine.

2. Set the clamping force only to the point that the weldment is held firmly in place. Any distortion of the weldment due to clamping force alone is indicative of excessive pressure. In no case should force be this great.

3. Set power on lowest setting and increase in steps until either a good weld is obtained or maximum power has been applied. If a weld is found using maximum time and by gradual increase in power, it is then possible that a change in clamping force may either improve the weld or make the weld condition possible using less time and/or power. Proceed with Step 4. If no weld or only a poor weld was obtained with maximum time and at maximum power, proceed with Step 7.

4. Gradually reduce clamping force to determine whether or not the original clamping force estimate was on the high side. If the weld condition can be improved by reduced clamping, the optimum clamping force can then be established.

5. The next step would then be to try reducing power to optimize power against the clamping force now established, time still remaining at maximum.

Inasmuch as weld is a function of time and power, each is, therefore, compensated to some degree by the other, i.e. a short time cycle and high power will produce a weld that can be duplicated by a longer time cycle and lower power.

A good compromise for time and power would be to utilize the highest power that will yield a good weld with minimum deformation and no detriment to the weldment. This approach keeps the time cycle on the short side, a point usually of interest where production is involved.

6. To arrive at a compromise for time and power combined, gradually reduce the time and increase the power, when necessary to compensate, until further increase in power either leads to excessive deformation or permits no further reduction in time.

In the event that reduced clamping caused a decrease in the quality of the weld, the same procedure of optimizing power as in Step 5, and the combination of time and power as in Step 6, should be followed after increasing the clamping force to ascertain at what point clamping is optimum. It should be remembered that for each change in clamping force or power, the resonant frequency of the transducer coupling system may change slightly. When this happens, the oscillator must be retuned to match the transducer frequency.

7. If no weld was obtained by Step 3, with both time and power at maximum, gradually reduce clamping force to determine whether or not the original clamping force estimate was on the high side.

8. If a weld can be obtained by reduction in clamping force the next step would be to try reducing power to optimize power against the clamping force now established, time still remaining at maximum.

continued

Tabulation of Step 1 through Step 9

| | Time | Clamping Force | Power | REMARKS |
|------------|-----------------|---------------------------------|--|---|
| Step 1 | Max. | | | |
| Step 2 | Max. | Estimated | | |
| Step 3 | Max. | Estimated | Increase in steps | Weld obtained—proceed with Step 4 (a) No weld—proceed with Step 7 (a) |
| Step 4 (a) | Max. | Reduce in steps | Level established by Step 3 | Weld improved—proceed with Step 5 (a) Weld quality decreased—proceed with Step 4 (b) |
| Step 5 (a) | Max. | Level established by Step 4 (a) | Reduce in steps | Optimize power and proceed with Step 6 (a) |
| Step 6 (a) | Reduce in steps | Level established by Step 4 (a) | Increase when necessary to compensate for time reduction | Time and power combination optimized— OPTIMUM WELD |
| Step 4 (b) | Max. | Increase in steps | Level established by Step 3 | Optimize clamping and proceed with Step 5 (b) |
| Step 5 (b) | Max. | Level established by Step 4 (b) | Reduce in steps | Optimize power and proceed with Step 6 (b) |
| Step 6 (b) | Reduce in steps | Level established by Step 4 (b) | Increase when necessary to compensate for time reduction | Time and power combination optimized— OPTIMUM WELD |
| Step 7 (a) | Max. | Reduce in steps | Max. | Weld obtained—proceed with Step 8 (a) No weld—proceed with Step 7 (b) |
| Step 8 (a) | Max. | Level established by Step 7 (a) | Reduce in steps | Optimize power and proceed with Step 9 (a) |
| Step 9 (a) | Reduce in steps | Level established by Step 7 (a) | Increase when necessary to compensate for time reduction | Time and power combination optimized— OPTIMUM WELD |
| Step 7 (b) | Max. | Increase in steps | Max. | Weld obtained—proceed with Step 8 (b). No weld— WELD NOT FEASIBLE |
| Step 8 (b) | Max. | Level established by Step 7 (b) | Reduce in steps | Optimize power and proceed with Step 9 (b) |
| Step 9 (b) | Reduce in steps | Level established by Step 7 (b) | Increase when necessary to compensate for time reduction | Time and power combination optimized— OPTIMUM WELD |

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Klincher
FREE-RUNNING
LOCKNUTS

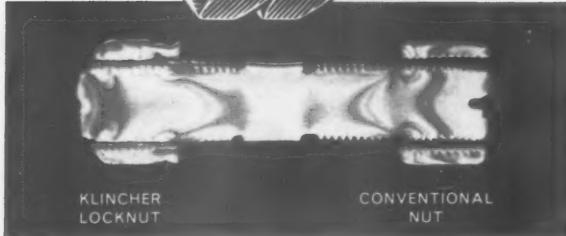
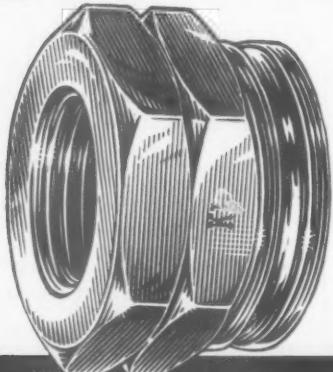


Photo Elastic Analysis of Klincher Locknut and conventional nut showing stress pattern. The diffusion of the load by the Klincher Locknut increases the load bearing capacity of the stud over the conventional nut by one and one-half times.

Photo Stress Analysis
W. E. BeVier, University of Minnesota

KLINCHER Free-Running Locknuts resist all ranges of vibrational stress by locking in radially and axially on the work. This principle not only amplifies the locking power greatly; but, by the method employed, diffuses the load throughout the nut and stud and permits the load potential of the stud to be more fully utilized.

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Ultrasonic Welding, continued

9. The combination of time and power may then be optimized, as in Step 6, by gradually reducing the time and increasing the power when necessary to compensate until further increase in power either leads to excessive deformation or permits no further reduction in time.

In the event that reduced clamping did not produce a weld a gradual increase in clamping force should be tried. If a weld is then obtained, the same procedure of optimizing power, as in Step 8, and the combination of time and power, as in Step 9, should be followed.

As previously mentioned, the oscillator tuning should be checked each time the clamping force or power is adjusted. It should be returned when necessary to match the resonant frequency of the transducer.

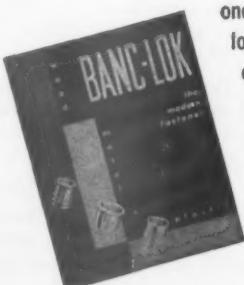
If a weld cannot be obtained, having gone through the range of clamping force, with maximum time and power (assuming a properly designed weld tip), one of two conditions exists. Either the materials being tried in the weldment are not compatible for ultrasonic welding, or the welding machine being used is not capable of providing sufficient power to perform a weld with the weldment involved. This diagnosis only applies, however, provided the oscillator frequency is maintained at the resonant frequency of the transducer coupling system for every change in clamping force or power.

The above procedure may appear to be somewhat complicated and time consuming. A tabulation in brief of Steps 1 through 9 is shown in the accompanying table to help visualize the over-all procedure, and to facilitate its use once the details of each step have been understood. When an understanding of each variable has been accomplished, and some experience gained in the observation of an ultrasonic weld, it is then possible by following this procedure, to check for feasibility of any weldment in a relatively short time. Considering the amount of variables and possible combinations involved, without a methodical approach, the obtaining of an optimum weld is much more likely to be accidental than by design.

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Says John H. Hepner, Purchasing Agent for Western Newell, "Keystone helps us produce a better sash rod through their close cooperation in developing and maintaining a wire most suitable for our use."

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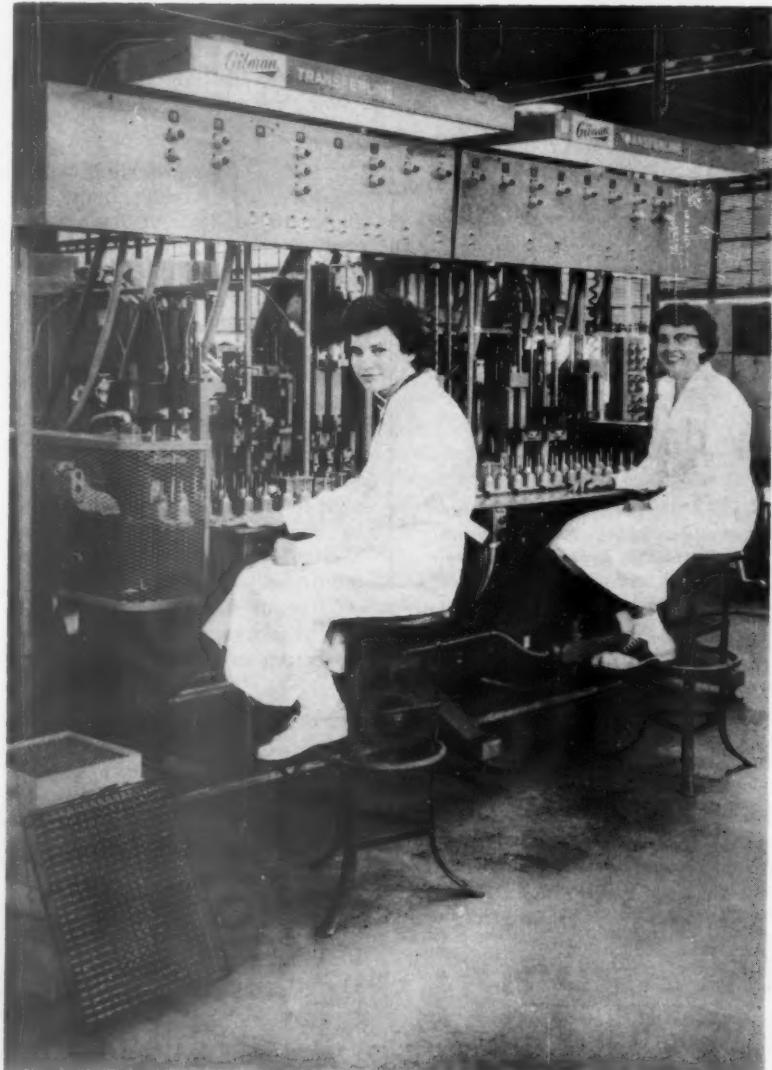
Pat. Pending

PARKER-KALON, a division of General American Transportation Corporation, Clifton, New Jersey. Offices and warehouses in Chicago and Los Angeles.

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WHY PARKER PEN TURNED TO AUTOMATIC ASSEMBLY



Just two operators are required to handle the 16-station automatic assembly machine installed at Parker Pen Company. The \$80,000 unit has a pay-back time of only five months on a two-shift basis.

- ... built from standard parts
- ... a 5-month payback period
- ... improved quality control

An automatic assembly machine built from standard parts is expected to pay for itself in five months at the Parker Pen Company's Janesville, Wis. plant.

The cam-actuated Transferline was demonstrated at the recent Production Engineering Show in Chicago where Gilman Engineering & Mfg. Co., the builders, report it can be used to assemble anything from delicate electronic components to an automobile part.

Parker will assemble caps for pens at the rate of 2880 per hour. It will replace 23 workers on a two-shift basis, saving 65,512 man hours per year. The machine will require 600 square feet less of floor space than present assembly area and improve quality control by an automatic inspection feature.

The Parker machine has 16 stations, where specific tasks are performed in synchronization. At one station a pocket clip is attached, at another the company imprint is stamped on the cap barrel, and so on. Two operators are required.

According to Gilman officials, the "building block" principle brings automation of assembly within reach of many firms who previously could not consider it because of cost or frequent model

continued



Fischer produces "specials" every day!

It's easy to mass produce precision turned nuts in odd sizes, shapes and threads . . . *AFTER years of specialized experience!* This capability also requires special machinery and advanced production methods to assure premium quality nuts and on-schedule deliveries at competitive prices.

Specializing in turned nuts for more than 30 years, Fischer has developed unique manufacturing and quality control techniques for precision nuts ranging from $\frac{1}{8}$ " to $1\frac{1}{16}$ " in diameter. More than 3400 different types of "specials" . . . both brass and aluminum . . . already have been supplied for use in all types of products.

Fischer nuts can help solve your fastening or assembly problems because each one is tapped square with face to Classes 2, 2-B and 3-B tolerances, countersunk both sides, furnished cleaned, burless and ready to install.

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and price lists.



Parker Pen Assembly, continued



This is a view of the old manual assembly line at Parker Pen Company's Arrow Park plant in Janesville, Wis.

changes. The Transferline can be modified for model changes at about 15 to 25% of its original cost. Standardized parts include the frame, which comes in varied lengths, and station mechanisms. Tooling attached to the mounting blocks is customized, as are the simple plate-type cams which yield the desired station motions.

Further savings can be gained by companies who purchase the standardized parts and do their own tooling. The basic beds have full-length machined surfaces and T-slots for simplified station mounting.

Introduced on a limited basis one year ago, the Transferline is operating in 10 plants. •



"He was all ready to sign when I got there. Then my zipper stuck."



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Substantial savings are often achieved through the use of low-cost cold-headed parts in place of complex assemblies or pieces requiring several machining operations. The examples shown here represent a wide variety of possibilities, yet these are only a few of the thousands we have produced. Our sales engineers and field representatives are ready to give you skilled advice on potential adaptations to your products. Just call your Elco man.

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WILL AUDIO-VISUAL SYSTEMS



At ACS work station, audio-visual instructions permit worker to assemble a complete product which is built up

while held on special Wilton work positioner. Complete work station is designed for maximum efficiency.

OBSOLETE STRAIGHT-LINE ASSEMBLY?

... maybe not for end-products larger than portable radios or tv, but for these and smaller products, this new technique has some definite advantages over traditional straight-line assembly systems. Here is the story on audio-visual . . .



by William D. Engstrand West Coast Editor

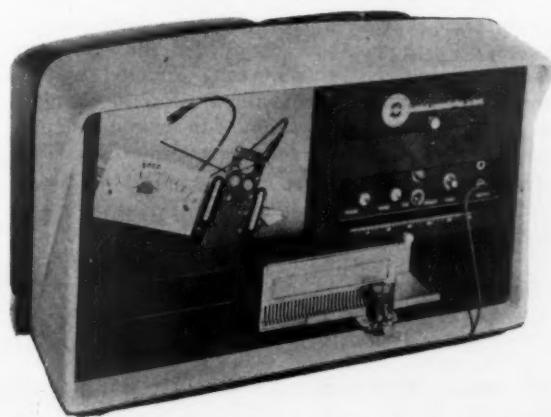
Want to cut your assembly time and improve product quality at the same time? Want to eliminate problems caused by absenteeism along the assembly line? Then why not take a cue from some major electronics manufacturers who are turning to audio-visual techniques in the assembly of small complex products. This relatively new assembly concept is centered around individual work stations which turn out complete end-products. This system utilizes 35 mm slides for visual instruction which is synchronized with a magnetic tape playback mechanism for verbal instruction.

One manufacturer reports a 50% decrease in assembly time following the installation of an audio-visual system. Moreover, rejects due to assembly errors dropped 90 per cent. Another manufacturer of complex electronic equipment found that the use of audio-visual techniques resulted in an increase from two to five units per day per assembly line worker.

While the value of audio-visual principles has had growing recognition in recent years, their use in assembly work has been limited to only a few large companies. For instance, both Hughes Aircraft Company and Northrop Aircraft, Inc. evolved their own systems, and have been using them for some time in their own electronics assembly work.

Now the application of audio-visual has been given impetus by a company specializing in this field, namely Applied Communication Systems, of Culver City, California. This new firm is a division of Science Research Associates.

More than just the audio-visual aspects of these new systems contribute to the savings mentioned above. In fact, audio-visual components are only a part of the total work environment concept engi-



The audio-visual unit of "total work environment" station resembles a portable tv set and contains both 35 mm slide projector and synchronized sound-tape playback mechanism.

neered into such systems. The step-by-step audio-visual instructions supplement the work being performed at a work station specifically designed for the type of work involved. This work station design, in addition to optimum mechanical facilities, includes all the advantages derived from extensive micro-motion studies, and from studies relative to worker psychology, comfort, and mental attitude.

According to Applied Communication Systems officials, the audio-visual manufacturing concept actually reverses the old continuous production line method of assembly. Instead of being merely a "cog" on such a line, relegated to the routine of performing the same act over and over, each assembly worker is charged with the responsibility of producing a complete assembly. He finds this easy to do while following the step-by-step instructions provided by the audio-visual unit. At the same time the accomplishment improves his morale and gives him a better mental attitude toward his work.

continued

Audio-Visual Assembly, continued

"Other advantages accrue from this individual assembly technique," says G. L. deCaccia, ACS's industrial engineering manager. "The individual worker is not affected by absenteeism which often slows established straight-line assembly. His production speed is not dependent on other workers; neither is the over-all quality of the work he turns out."

"Another big advantage of the total work environment concept occurs when complex parts must be assembled in small lots. On a continuous assembly line, changeover from one product to another usually involves numerous line changes as to number of workers needed, parts stocking, etc. With the new system, the assembly worker has only to insert another set of slides and another tape cartridge in the audio-visual unit, and he is ready to go. In extreme cases, he could assemble a different product every time and without a time loss penalty."

It is pointed out also that because of the ready-at-hand step-by-step audio-visual instructions, worker training time is reduced to a minimum. Engineering changes on a product are conveyed to the assembly worker by merely replacing the affected photographic slides with new ones illustrating the change, and by re-wording that portion of the audio instructions concerning the affected operation.

The audio-visual unit replaces assembly line blueprints, instruction books, and other printed information. Thus, the time ordinarily spent in searching for and interpreting such information can be employed in actual assembly work. This also eliminates the possibility of misinterpreting either blueprint or printed information.

RESEMBLES PORTABLE TV

An audio-visual unit resembles a portable tv set. It contains an automatic slide projector for projecting the 35 mm colored slides onto a 5½" x 8" plexiglass viewing screen. The audio information is contained on ¼" standard magnetic tape encased in a regular tape cartridge. No tape threading is required as the tape cartridge is merely slipped into place in the playback mechanism. The tape and slides controlling a specific job reach the assembly worker in package form. He has only to put them in the audio-visual unit, press a button, and go to work.

An audio-visual unit is permanently mounted at each work station directly in front of, and at eye level with, the seated assembly worker. The worker receives the audio instructions through a pair of lightweight earphones. If desired, background music from a master system can be "mixed" with the audio instructions. This background music is automatically squelched while verbal information is being given.

Time standards for a specific job are engineered into the tape itself. Thus sufficient time is allowed to complete one assembly operation before a signal on the tape sounds, the slide changes automatically, and audio instructions for the next operation are given. If, for some reason, the assembly worker has



By removing the audio-visual unit, and changing a few modular components, this work station is transformed into a convenient end-of-the-line inspection booth.

not finished an assembly operation at the time the tape signals a change to the next, he merely touches a button which stops the tape but leaves the picture on the screen. After he has completed the operation, he touches another button which starts the tape and slide changing sequence again.

It is obvious that the efficiency of the audio-visual information depends upon proper programming of both tapes and slides. For optimum results in programming, close cooperation is required between design experts, methods engineering, industrial engineering, planners, and quality control. The purpose of this cooperation is to bring together all the complex knowledge of these departments, then plan the assembly work so it is cognizant of the demands of each.

After the job has been laid out in a manner to satisfy all requirements, it is then broken into work elements which lead to its step-by-step completion. Each step is then photographed separately under actual assembly conditions. Thus the slide shows not only how and where to install a part, but optimum positioning of the assembly for performing the work. Auxiliary slide information such as pointing arrows, numerical dimensions, or printed advice is included in the original photograph by using "props." Carefully worded verbal instructions are then dictated onto the tape which accompanies the slides.

To facilitate this programming work, ACS has

developed and conducts a comprehensive training course for users of audio-visual equipment, along with compact and portable photographic and tape programming kits.

While the audio-visual units can be used separately for many industrial operations, including personnel training, imparting specific instructions for testing, inspection and quality control, in depicting and explaining machine tool setups, and even in commercial sales work, insofar as assembly is concerned they have proved most efficient when incorporated in the total work environment concept. This includes, along with the audio-visual unit, a work station specifically adapted to the type of work to be performed.

These work stations are designed on the basis of careful micro-motion studies to organize the operator's work space in the most efficient manner. All work station fixtures such as part bins, tools, tool holders, and other equipment are carefully located after a detailed analysis of the assembly operation has been made. All parts to be assembled are assigned a very simple nomenclature and arranged in rotating bins in the most logical order for assembly.

Work station fixtures are completely modular designed. They can be joined together end-to-end, in

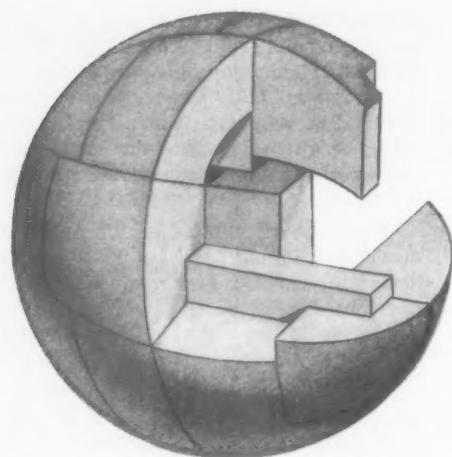
five-foot increments, up to any desired length. They are exactly the same on both sides. The tool holders, parts bins, bench tops, etc., are equipped with "plug-in" brackets, and can be easily removed or re-installed in minimum time. Thus one work station could be altered to another. The lightweight work station chairs are designed for maximum physical comfort.

"For most assembly operations, the work holders provided eliminate the need for bench top space," deCaccia says. "And for many years, industrial engineers have realized that work bench space is most conducive to poor working habits, poor housekeeping, and clutter."

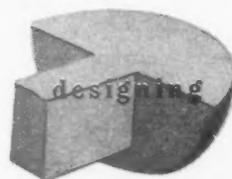
In briefing the potential future of audio-visual production, ACS officials point out that if the current trend persists, manufactured products will continue to become more complex and varied. Concurrently the task of imparting engineering, scientific, and quality control information on to the various production departments will become more complex. The ability of audio-visual techniques to reduce this complex information to a simple, understandable form, even for non-technical workers, will undoubtedly increase in importance in direct ratio to the complexity of the products produced. •

Hughes Aircraft pioneered in the field of audio-visual assembly instruction with their Video-sonic system which enables unskilled personnel to virtually train themselves in the technique of assembling complex electronic products.





integration

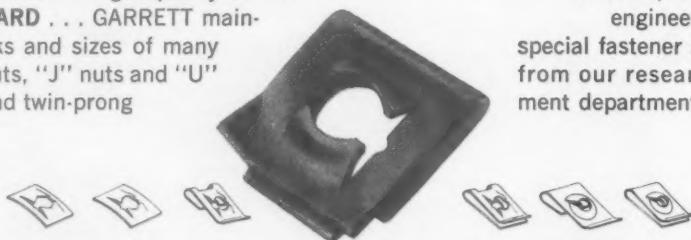


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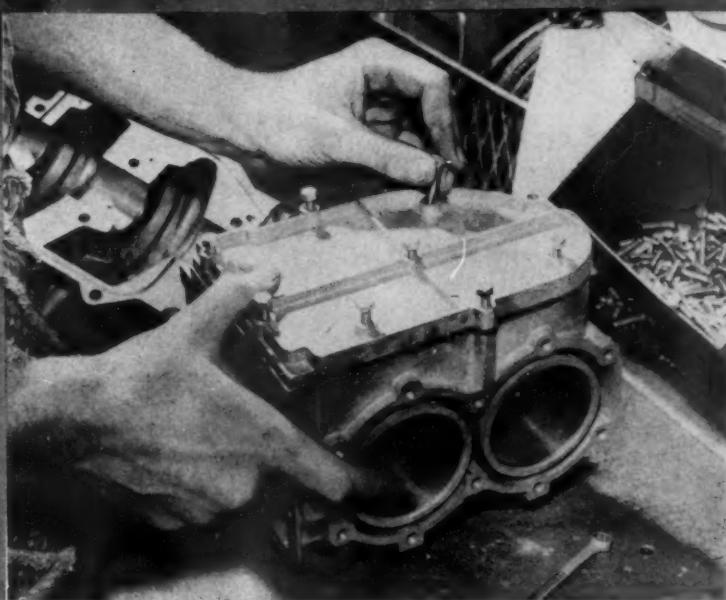


spring washers

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(Bottom) The screws holding the cover in place are coated with liquid lock. Bins in the background contain coated screws which will be driven with a portable power screwdriver.



Top At individual assembly points on the Scott assembly line, fasteners to be used are placed in a small plastic bag and Loctite added. The bag is tumbled and squeezed by hand until parts are thoroughly coated.

Scott Outboard Licks Fastener Vibration

In Scott outboard motors, fasteners tumbled in a special liquid lock no longer work loose.

The rise of the outboard motor industry since the end of World War II has been meteoric. Manufacturers have not only improved the small fishing motors, but have also developed powerful outboards that can tow the family cruiser or pull a water-skier at 35 knots or faster.

One of the success stories in the boating industry has been that of Scott outboard motors, a division of McCulloch Corporation. The company did not start making motors under its own brand name until after the war and now is one of the three largest manufacturers of outboards.

Scott is a company that has found an important assembly line use for Loctite, a thin liquid that hardens into a plastic bond when confined between closely fitting metal parts.

Vibration is an acute problem on any high horsepower motor. A motor of this size has to pack plenty of power to pull a cabin cruiser and the family living on it. Yet, even Scott's 60 h.p. motor is not very large in comparison to inboard motors. The power turned out by the motor's three cylinders is therefore concentrated through a metal frame about two-thirds the height of an average man.

The dozens of screws, bolts and nuts on so large an outboard motor could work loose unless there were some bonding agent to keep them tight. Scott has found a solution to its problem by applying small quantities of this thread-locking liquid to each fastener, which then hardens into a tough plastic that will not work loose.

According to Bill Heagberg, industrial engineer at the Marine Products Division in McCulloch's sprawling Minneapolis plant, the sealant is applied by tumbling. The parts are tossed for several minutes

continued

ALLEN

The cost of ALLEN Hex-Socket Cap Screws is only a minor fraction of your assembly costs . . . be sure you're getting the timesaving, cost-saving advantages of genuine Allens!

Ever since Allen first produced the hex socket head screw nearly fifty years ago, specifying genuine Allens (made by Allen of Hartford) has been a sure way to guarantee dependable threaded fastening.

Only genuine Allens have Leader Points that make starting easier, and greatly minimize danger of cross threading. Genuine Allens are "pressur-formd" to preserve the long fibers uncut throughout the length of the screw, giving stronger sockets for greater tightening torque.

Write for samples and engineering data. See how genuine Allens will make your product better.



Allen's new 1960 Series Socket Head Cap Screws give up to $2\frac{1}{4}$ times more load carrying capacity, without indentation.

Head diameter of sizes from $\frac{1}{4}"$ up is now uniformly $1\frac{1}{2}$ times the body diameter—providing more under-the-head bearing surface, and a proportionate increase in clamping force. Write for new Bulletin G-25, with full specifications.



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Liquid Lock, continued



Here the reed valve, a part of the motor's manifold assembly, is put together in an assembly jig. Only one small screw, coated with the liquid lock, is used.



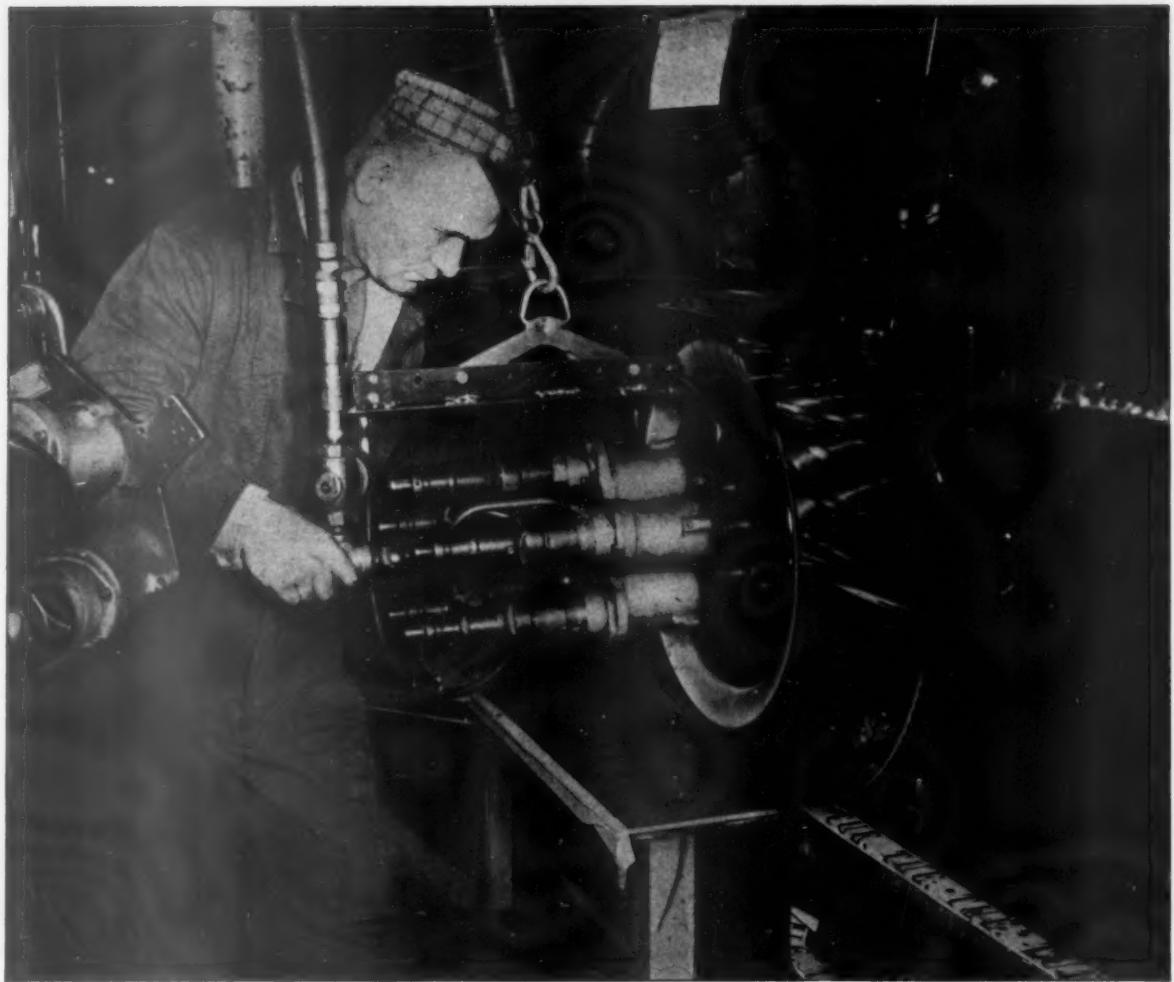
in a plastic bag containing the red fluid, and are then ready for fastening. As long as the sealant is exposed to air, it remains liquid.

One advantage of the product in assembly is the fact that there has been no waste. The fluid comes in small bottles holding 50 cc's, each of which can treat 3000 $\frac{1}{4}"$ nuts. The Scott company uses about 225 bottles a month with a negligible loss during application.

At Scott, treated parts must withstand the intense heat of the ovens where paint is baked on. The sealant's flash point, actually, is above 200°F. Also, many of the motors are used on ocean-going craft and Loctite effectiveness is not destroyed by salt water •



"A meatball. Why?"



Touch a button—tighten many nuts at once to precision torque

This auto manufacturer tightened down on production costs by automating wheel-nut running. All five are tightened at once with a Gardner-Denver multiple nut setter.

These versatile tools are highly adaptable to a wide variety of time-consuming production jobs. At the touch of a button, nuts of different size, angle or elevation are tightened to precise torque. Tighten two, three, five, twenty or more.

MODEL CHANGE

Standardized components make switching from job to job quick and easy. When bolt pattern changes, simply move the standard

spindle and handles to a new, job-tailored mounting plate. And Gardner-Denver can also engineer one of its new, adjustable multiple nut setters for you. Here, when your production run includes several similar bolt patterns, you merely push a button to reposition the tool. No change in mounting plate is required.

Find out how Gardner-Denver nut setters, along with a complete line of other production-speeding air tools, may solve tough problems for you...lower unit costs. Contact your Gardner-Denver air tool specialist or write for new Bulletin 16-101.



Tighten entire nut clusters in one operation with Gardner-Denver multiple nut setters. Write for further information.



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the automatic torque control tools
that made industry stop, look
and examine their methods
of setting screws, nuts,
and bolts.



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Cleomatic Right Angle Nut-Runner

Cleomatic* No. 10 Series Screwdriver—Nut-Runner: These are the tools that enable you to set torque to the most critical specifications . . . then forget it. Torque is positively maintained by a no-drift locking device. A long wearing, non-friction clutch is quickly adjusted when torque change is desired. *This is the only torque control air tool that starts and stops automatically!* Operator merely engages the screw with bit, the tool starts. When torque is reached, the tool stops. Motor operates only during rundown. Less air is used. Wear is reduced. There is no quality let-down at the end of a shift because control is in the tool. This tool has little impact, is shorter, and weighs less than competitive tools. No. 10 Cleomatic Screwdriver—Nut-Runners are available in pistol grip or straight handles in speeds

from 400 to 2,900 r.p.m. Reversible or non-reversible.

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available with both recessed socket heads and double-end spindles (reversible). Speeds range from 250 to 1,000 r.p.m.

NOW AVAILABLE! Cleomatic No. 6 Series Screwdriver—Nut-Runners: Essentially the same tool as the Cleomatic No. 10 Series—but smaller and lighter. No. 6 Series is equipped with the same unique torque control principle. The same automatic start and stop mechanism. They enable you to make even greater cost savings in the production line operations of automotive, aircraft, appliance, and electronic industries. Cleomatic No. 6 Series Screwdriver—Nut-Runners are available for delivery.

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Assembly and Fastener Engineering



Components are fed in precise assembly sequence to speed printed circuit board production.

PARTS DISPENSING UNIT BOOSTS ELECTRONICS ASSEMBLY EFFICIENCY



How did Regentone Radio eliminate errors in assembling printed circuits? By using an indexing machine which dispenses up to 38 different components in assembly sequence.

A new component storage and dispensing machine developed by Work Study Equipments, Woodford Green, England is speeding electronics assembly wherever used. This rotary indexing machine stores large quantities of small components and dispenses them in correct assembly sequence to a point only a few inches from the assembly area.

Rotasembler eliminates complicated identification of parts by the operator and greatly reduces the amount of space required to store quantities of many types of components. The indexing mechanism is compressed air operated.

At present, 20 units are in use at Regentone Radio and Television Ltd., where they are required to store and dispense small electrical components such as resistors and capacitors used in the production of printed circuit radio and television receivers. These units replace fixed part layouts of bins arranged around the operators. They have resulted in labor and space savings, and in a 40% efficiency improvement in the assembly section alone.

Despite its extremely compact appearance (28" circumference and 26" high) the Rotasembler is capable of storing up to 38 different components in 19 vertically divided hopper units. Each of these 38 hoppers can store as many as 2000 small components. The hoppers are mounted on two support rings attached to a center shaft which is driven by a simple indexing mechanism. This mechanism comprises a chain-driven ratchet gear operated by a 1½" bore, 2" stroke double acting air cylinder and a small brake assembly. A foot valve controls the movements of air cylinder and brake which in turn controls the indexing movements of the hoppers.

It is reported that almost total elimination of assembly errors can be achieved. The operator is pre-

continued

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Stress and fatigue are the most common causes of screw failure. These failures develop in the first three threads below the joint or seam. As the vibration increases in its frequency scale the stresses which develop literally fatigue the grain and molecular structure and tear the metal apart.

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KLINCHER'S SELF-LOCKING KAPScrew design resists stress and fatigue by diffusing the stress throughout the load bearing areas of the kapscrew. Extra resistance is added where high stress normally develops, the locking collar diffusing the stress and locking the kapscrew radially and axially. With all these advantages, **KLINCHER SELF-LOCKING KAPScrews** may be reused hundreds of times.

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KLINCHER KAPScrew, INC.

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Electronics Assembly, continued

sented with a single and habitual path of travel for each component and identification of components is made almost unnecessary. These factors combine to produce a regular rythmical operating sequence, which reduces operator fatigue and speeds up assembly. Approximately 2000 components per hour can be assembled by one operator, which has more than doubled the previous production rate. The machine's simplicity has also resulted in a considerable reduction in operator training time.

The machine is adaptable for quick changes in manufacture. Experience has shown that once installed, each unit can be put to a variety of uses, for storing and dispensing many types of components or for the bulk storage of a few types where large quantities are rapidly used.

METHOD OF OPERATION

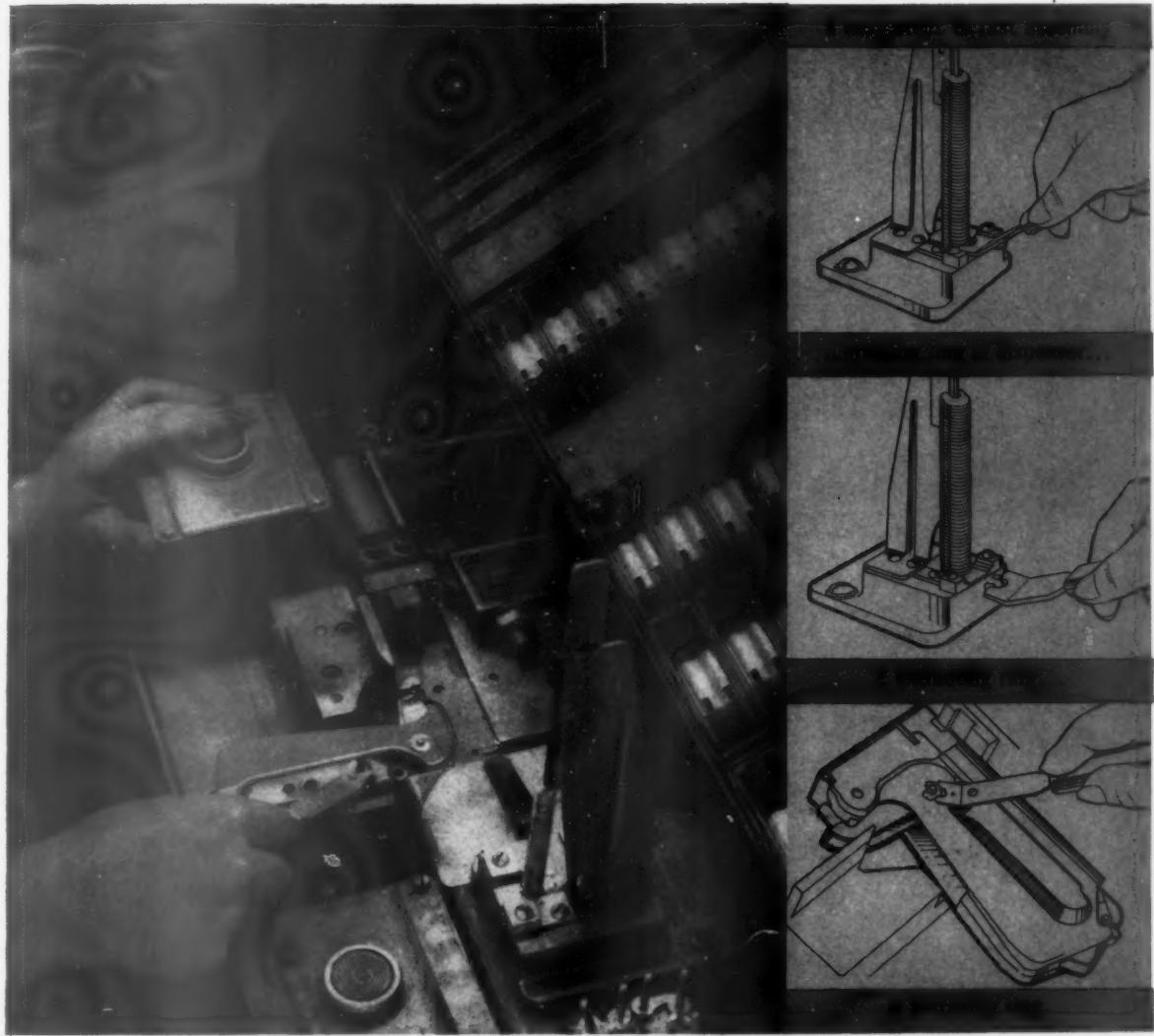
Each storage hopper unit, constructed in thin steel sheet with an enamel hammer finish, is divided vertically to provide two hoppers. The feed lip of the outside hopper is located above the feed lip of the inside hopper and both are fitted with an adjustable gate which controls the flow of components to the feed lips. The dividing plate between each hopper protrudes above the level of the top of the double hopper unit to facilitate easy filling and to provide space for identification of the rear components. The hoppers are removable and allow ease of access to the indexing mechanism which is located within the circle of hoppers.

The Rotassembler unit is carried on a Y shaped mounting plate which is bolted to the assembly area at three points. In the center of Y plate is a rigid support shaft located on a mounting block reinforced by steel buttresses. Over this shaft is placed a hollow drive shaft with a bearing journal at the upper end and the indexing mechanism attached to the lower end. Two sets of three spokes radiate from the drive shaft and these are attached at their outer ends to two support rings which carry the 19 removable hopper units.

INDEXING MECHANISM

The indexing mechanism comprises a ratchet gear wheel and a fixed gear wheel attached to the drive shaft. The ratchet gear is driven by a short chain which is attached at one end to the center of a pivoted lever, and at the other end by a spring attached to a raised peg on the Y plate. When the foot operated valve is depressed by the assembly operator, compressed air passes to the forward end of the air cylinder causing the cylinder piston to retract, which in turn moves the lever and chain. During this movement, the chain is drawn past the disengaged ratchet gear and the spring on the end of the chain takes up the chain slack.

On releasing the foot valve, air passes to the mounting end of the cylinder and forces the cylinder piston outward thus moving the lever away from the ratchet gear. This causes the chain to be drawn past the gear which is now in the engaged position and turns the drive shaft and hoppers through 19°. *



Truarc rings and dispenser speed staple gun assembly 60%

This big production increase was made by Swingline, Inc., Long Island City, N. Y. in assembling the handle lock of their high-compression staple gun.

To speed production, the Truarc Prong-Lock® Series 5139 retaining rings come *pre-stacked* for use on the Truarc *dispenser* (shown in foreground of photo above). Application is simple, fast and requires no skill. The operator, using the Truarc *applicator*, grasps the bottom ring, removes it from the stack, and installs it, quickly and easily, in the staple gun assembly.

The Truarc ring replaced an ordinary flat "C" washer, previously used in this application. While the unit cost of the washer was lower than that of the Truarc retaining ring, the use of the rings resulted in assembled cost savings of \$25.00 per thousand staple guns. The reasons: a 60% increase in production due to faster, easier assembly with Truarc tools, and the elimination of time-consuming, costly adjustments made possible by Truarc rings. What's more, the bowed Prong-Lock ring improved product design by providing resilient end-play take-up... eliminating looseness or binding in the parts.

Truarc retaining rings come in 50 functionally different types... as many as 97 different sizes within a type... 6 metal specifications and 13 finishes. Truarc assembly tools, pliers, applicators, dispensers and grooving tools are available to speed production of virtually every kind of product. Make sure you have on file the new 16-page Waldes Truarc Assembly Tool Catalog No. AT 10-58. Write for your copy today. And remember Waldes engineers are always ready to help you solve your special application problems. Waldes Kohinoor Inc., 47-16 Austel Place, Long Island City 1, N. Y.

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TEENUTS

more than

600

COST-CUTTING
VARIATIONS

The name TEENUTS is a registered trade mark of the United Carr Fastener Corporation

Since the first TEENUT was developed by Carr Fastener in 1927, more than 600 different modifications of this extremely versatile device have been designed and manufactured in true, mass-production quantities.

By combining nut and washer in one solid unit, the DOT TEENUT offers exceptional strength and security and eliminates the need for tapping. Its flanged base can be formed with welding bosses for attachment to sheet or solid metal structures . . . with prongs for wood . . . or with any number of different special bases for particular applications. DOT TEENUTS can be made in heat and corrosion-resistant materials and they can be provided with moisture-seals and vibration-proof,

self-locking barrels.

Once mounted, the DOT TEENUT stays put and can't be lost or mislaid . . . an advantage at any time and a necessity where blind fastening is required.

Wide experience in the proper application of DOT TEENUTS and a multitude of other special-purpose fasteners enables your DOT field representative to provide prompt and effective solutions to a tremendous variety of fastening problems. Where special design work is needed, he can bring you the services of a design-engineering group unequalled in its field.

The DOT TEENUT catalog is an invaluable reference . . . yours on request.



CARR FASTENER COMPANY

Division of United-Carr Fastener Corporation, Cambridge 42, Mass.

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DETERMINING TORQUE WITH A TENSION-TESTER

Is torque wrench tightening enough? Or is the actual clamping force between nut and bolt the determinant of holding power?

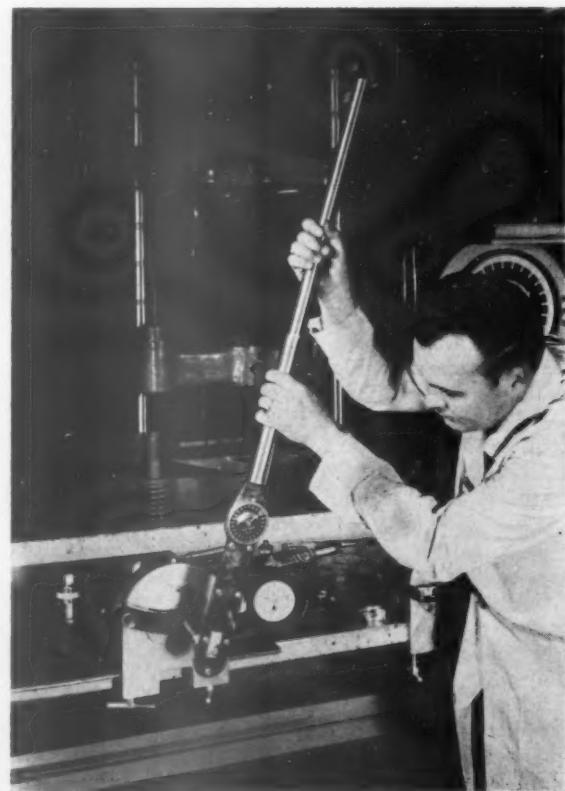


Figure 1. In tension-testing a steering knuckle bolt, note that the actual parts have been assembled in the tester to assure accuracy.

by Carl E. Sutherland, Jr.
Vice President—Engineering
Skidmore-Wilhelm Mfg. Company

Tightening a nut may seem like the simplest kind of task, but it is a subject that deserves a great deal of attention. Interestingly enough, proper attention to this matter can pay handsome dividends both in improved product quality and in reduced production costs.

Traditionally, critical nut and bolt assemblies have been tightened to specific torque ratings as determined by a torque or impact wrench. In theory, this procedure is adequate. In practice it has been found that other factors besides the ft/lb applied to the bolt affect a fastener's holding power. It has been shown that the actual clamping force between a nut and a bolt is the only accurate and consistent means of determining the holding ability of a fastener.

The major deterrent to using clamping force as a means of specifying bolt tension has been the difficulty of measuring this force. The problem has been solved with the "tension-tester" which was developed by our company especially for this purpose.

At one automotive plant, for example, this device checks the torque/tension relationship on all critical fasteners used both in engines and in steering, front end, and axle assemblies.

The procedure used in establishing bolt tension standards as well as for spot checking actual production line assemblies is relatively simple.

When a new part is developed, the design engineer determines the maximum stress (plus a suitable

continued

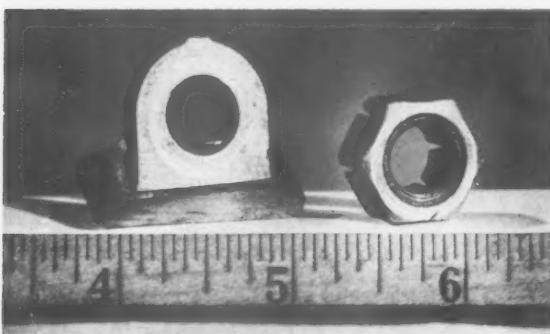
Tension Testing, continued

safety factor) to which the bolt or screw will be subjected during service. Since the bolt must be capable of resisting this force, the maximum applied stress becomes the minimum load on the bolt. A suitable bolt is then selected on the basis of strength requirement. Seventy-five per cent of proof load becomes the maximum load to which that bolt may be subjected. The question then becomes one of matching bolt capacity as closely as possible with the stress in the part.

Since it is impractical to measure actual tension under production line conditions, the tension-tester is used to establish the torque required to produce the proper tension in the bolt during assembly. In establishing the proper torque/tension relationship, it is essential that typical nuts, bolts and washers be used under conditions simulating assembly line practice.

Typical parts are selected at random, assembled in their proper relationship in the tester, and tightened with a torque wrench. As the assembly is tightened, the actual clamping force in pounds is read on a gauge mounted on the tester. When the proper value is attained, the torque required to produce this force is read on the torque wrench. After a number of assemblies have been checked in this manner to assure a reliable figure, the production department is advised of the proper torque to be applied.

The importance of duplicating actual production



Figures 2a and 2b. Two seemingly identical nuts were tightened against cut-out portion of connecting rod. In one case (above) 80 ft/lbs of torque produced 13,000 pounds of clamping force. In the other (below) 145 ft/lbs of torque were required because of burrs and unevenness on face of nut.

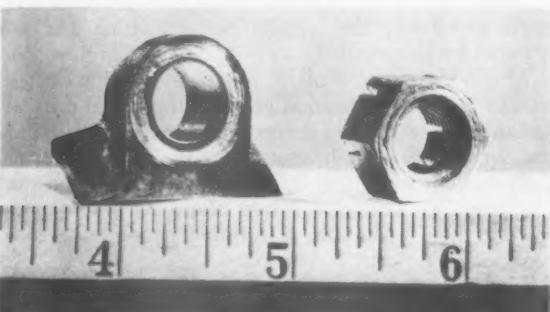


Figure 3. Tension-tester is used here to check the torque required to produce the recommended clamping force in an engine connecting rod. Dials on tester are calibrated to read in actual pounds of tension induced in the bolt.

line conditions is difficult to over-emphasize. Consider a typical $\frac{5}{8}$ "-18 bolt tested under two different conditions. Using a standard nut and lock washer bearing against a hard surface, it required 280 ft/lbs to apply a clamping force of 16,300 lbs. When the same assembly was tightened against a soft bearing surface, an additional 100 ft/lbs were required to achieve the same clamping force. In this case, a large portion of the applied torque was wasted in overcoming the resistance of the soft bearing surface.

Tests like the one cited above, as well as a host of others, have disclosed that attention to minute details, as well as subtle changes in fastener design, can result in both product quality improvement and cost reduction.

Figures 2A and 2B illustrate a typical situation where sections sawed from connecting rods were tested. In one case, Figure 2A, the nut was tightened to the prescribed 13,000 lbs clamping force by applying 80 ft/lbs of torque. The other nut, Figure 2B, required 145 ft/lbs to achieve the same load.

Casual inspection indicated that both nuts were identical. A closer look, however, showed that the bearing face surface of one nut was not flat and that the corners had tiny burrs. When this nut was tightened, it scored the surface of the connecting rod causing the metal to gall. As a result a large portion of the torque applied to the wrench was wasted by additional friction instead of tightening the nut.

There are cases where adequate testing of fasteners has saved money as well as improved quality. In one instance, almost \$45,000 was saved annually as a result of testing procedures on fasteners.

In still another case, three different types of bolts were tested. Checks showed that two did their job

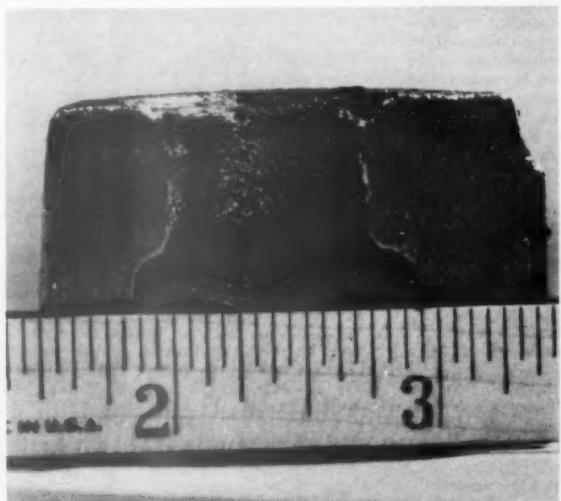
properly. The third failed to provide the desired clamping force due to surface friction characteristics, even though its over-all quality was the highest of them all. Once this condition was corrected, the originally unacceptable bolt became a satisfactory product.

Because of cases like these, many firms are beginning to look on bolt tension testing as a basic form of quality control. Since the tension-tester makes accurate checking a routine procedure, nearly every critical fastener can now be checked. Although such testing programs have been underway for several years, more testing is being done today than in the past since the tests can be made in a matter of minutes.

Before the tester was developed, it often was necessary to check bolt tension on the basis of the bolt's modulus of elasticity. Ball bearings were brazed to both ends of the bolt and the length was checked with a micrometer before and after tightening. The elongation of the bolt was then used to calculate the clamping force. Obviously such a complicated procedure was not conducive to frequent testing.

Actually, tension-testing of bolts is becoming more and more important as products are more carefully designed. An example of this is concerned with a leading engine manufacturer. In the past, whenever a question of tension arose, they simply used oversize bolts. But when a new engine was developed, for which space and weight requirements were at a premium, they found there was no room for oversize bolts. It was essential to save every ounce of weight possible. They found that with careful bolt tensioning during assembly they could achieve more effective fastenings with smaller bolts. Thus, a problem of long standing was solved by inaugurating a program of accurate fastener tightening. •

Figure 4. This cross-section of a U-bolt bracket shows what can happen when an imperfect nut is tightened against a relatively soft bearing surface. The metal galls and tears, causing the torque applied by the wrench to be wasted in friction rather than in tightening the nut.



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IF SO, your problem can be solved with MIDWEST "SINTERED" BRASS NUTS AND WASHERS. Huge savings are possible as we apply entirely new and different powder metallurgy techniques to the volume production of small parts and fasteners including brass nuts and washers. Precision workmanship and high quality are the hallmarks of Midwest. Leading manufacturers (names on request) have switched to Midwest. So test and compare. Send today for prices and samples.

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The versatile half-turn fasteners combine the advantages of a quick acting panel lock with those of an elastic shock isolator.

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- Absorb shock, vibration

The Vibrex Fastener locks by means of an expanding, waterproof and dustproof sleeve of especially compounded rubber. This forms an elastic suspension which actually floats the panel-base assembly in live resilient rubber.

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AS SMITTY SEES IT



Got a question, challenge, puzzle to share or story to tell? Shoot it along, we'd like to meet you.

FUDGE FACTORS

How many times have you found this Law—promulgated by Dr. Finagle—to be true?

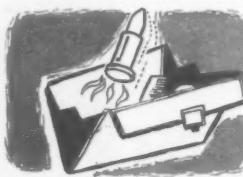
In designing any type of joint, no overall dimensions can be totaled correctly after 4 p.m. Friday.

Corollary 1—Under the same condition, if any minor dimensions are given to 1/16", they cannot be totaled at all.

Corollary 2—The correct total will be self-evident at 9:01 Monday morning.

DON'T TELL WALTER

Automation is bringing a new kind of fringe benefit. Workers in an automated British oil refinery see so few human beings that they have demanded "lonely money."



HOT LIPS

Because certain hydrocarbons ignite spontaneously in pure oxygen, somebody got excited over the possibility that lipstick might burst into flame when pure oxygen was released automatically upon accidental loss of pressure in commercial jet planes at high altitudes.

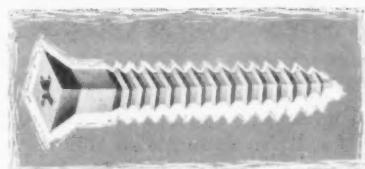
Presumably the average woman would be quite burned up over such an occurrence. Under certain conceivable conditions, even male passengers might be affected.

However, we may relax. Detailed studies have proved that all shades and makes of lipsticks are unaffected by pure oxygen under all pressures.

—Aerospace

MATH OVER LIGHTLY

Horace, a mechanical engineer, is twice as old as his wife was when he was as old as his wife is now. He is 24. How old is his wife? (Answer on page 72.)



NEW PRODUCTS

There is a lot of talk about the dangers of putting square pegs in round holes. But this isn't really the problem it is cracked up to be simply because there don't seem to be many square pegs on the market. We know because the people at Dumont Industrial Screw Corp. tried to get some for some square holes. They couldn't find a single source.

So, with that untapped market, they have designed the pictured fastener. Starting immediately, their entire line will be available in either round or square style. When ordering, please specify "R" for square and "S" for round. They hope to continue to confuse their competitors.

DEFINITION

Quality Control—The engineering method devoted to learning how much the customer will tolerate.

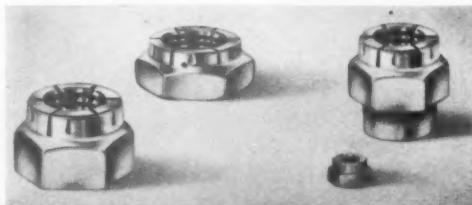


TIGHT IS TIGHT

Every now and then one stumbles upon gems of wisdom in the humblest of places. Recently while in a job shop we spotted a rather straightforward assembly operation. Asking the man behind the wrench how he was determining proper torque, we got the reply: "Oh, I just pull until my shoulder twitches, and if the bolt doesn't break, it's tight enough."

"When computing, remember that the eye of the chief engineer is more accurate than the finest instrument."

Self-locking nut that locks without seating, **FLEXLOC**



Left to right: full height, thin, microsize, clinch nut.

Three of the most significant features of 1-piece all-metal FLEXLOCS: they are self-locking; they lock without seating; they won't work loose, regardless of vibration.

With FLEXLOC no lockwashers, jam nuts, cotter pins or other auxiliary locking devices are needed. There's nothing extra to put together, come apart or get lost. Your design problem is simplified. Assembly time and costs are reduced. And maintenance expenses are lowered because FLEXLOCS can be readily removed and repeatedly re-used.

What's more, since FLEXLOCS lock without seating, they serve as stop nuts, staying put anywhere on bolt or stud once $1\frac{1}{2}$ threads of bolt are past top of FLEXLOC. And there's no need to worry about the effect of "shake, rattle or rock" on FLEXLOCS. They just won't budge, even in the face of terrific impact, ceaseless vibration.

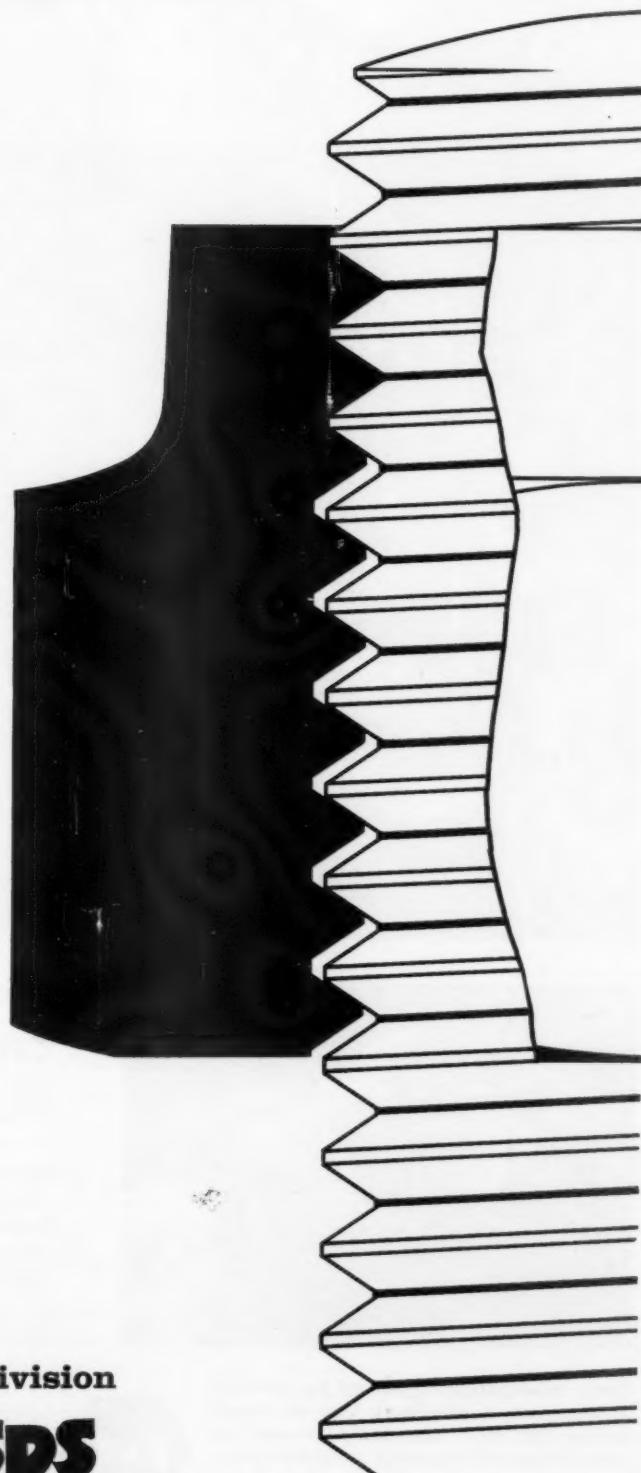
FLEXLOC Clinch Nuts—Designed for use in thin-section materials, they make blind fastening easy, are ideal where dismantling and reassembly is required. They are simply clinched into the material to be assembled and become an integral part of it. Use FLEXLOC Clinch Nuts in place of anchor, weld or cage nuts.

See your authorized SPS distributor for complete information on sizes, materials and finishes. Or write SPS—manufacturer of precision threaded fasteners and allied products in many metals, including titanium.

FLEXLOC Nuts

| PRODUCT | SIZES |
|------------------|-------------------|
| Full Height | #2 through 2" |
| Thin Type | #6 through 1 1/2" |
| Microsize | #0 through #4 |
| Clinch—regular | #4 through 5/16" |
| Clinch—microsize | #0 through #4 |

Regular clinch nuts come in 7 shank lengths,
microsize clinch nuts in 2



INDUSTRIAL FASTENER Division

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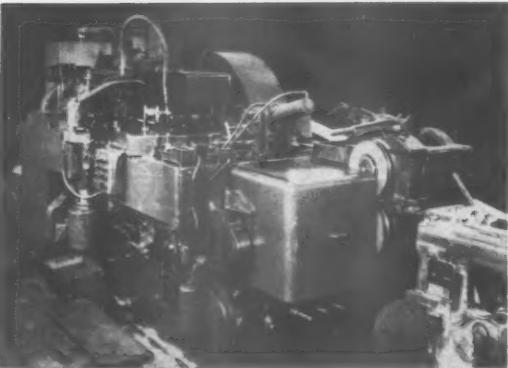
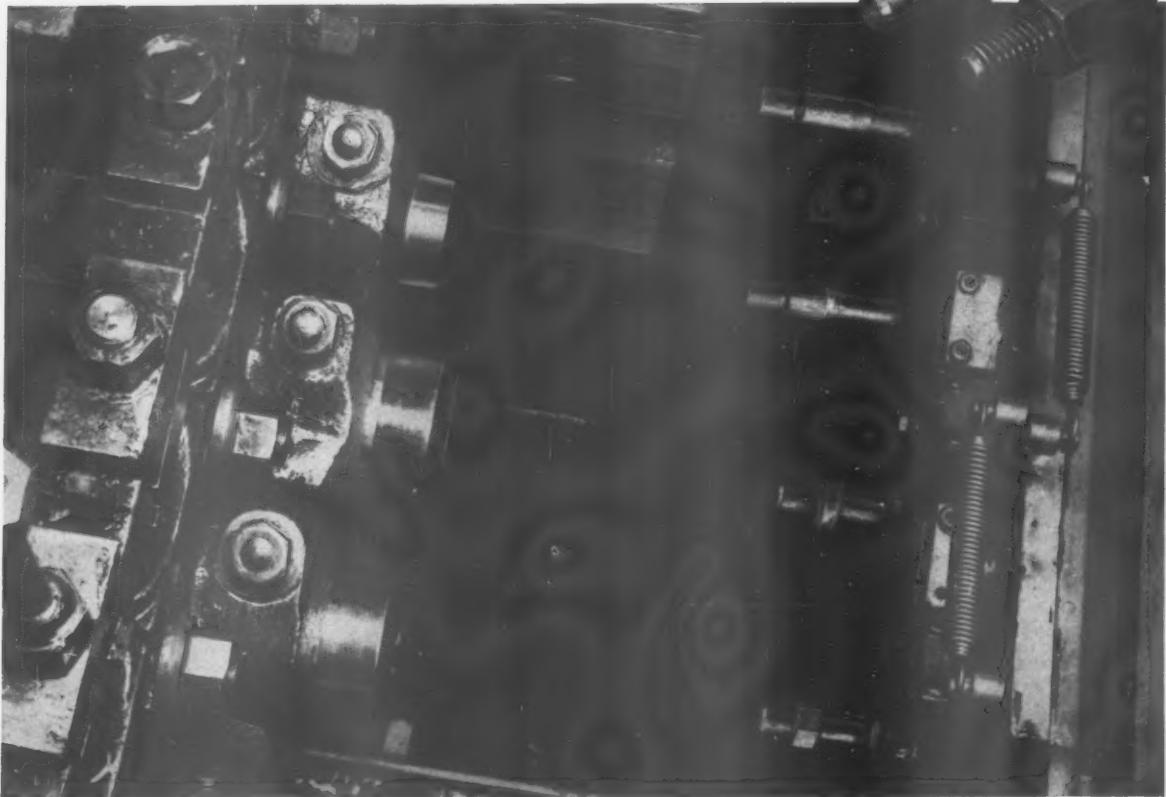
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Complex Fasteners

Cost Less

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New 5 Station Boltmaker
Gives You Free Forming
Operation!

Our new National 5-Station Boltmaker, shown here, speeds production for a lower cost on your specially formed fasteners. You get *at least one* extra operation without added labor or part handling.

This extra *free* operation, while generally used for forming, can also be used to obtain greater dimensional accuracy. Either way, you get more for your money from Ferry Cap.

Years of experience, backed by modern equipment, make Ferry Cap an ideal source for your complexly formed or close-tolerance fastener requirements. Start saving now with a call to Ferry Cap today!



Ferry Cap & Set Screw Company

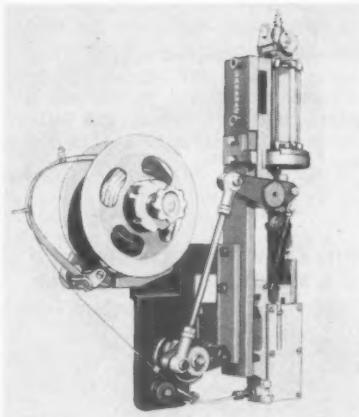
2151 Scranton Road, Cleveland 13, Ohio

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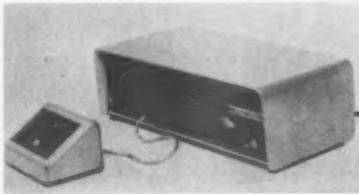
Assembly and Fastener Engineering

WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 78. Just circle the number on the card matching the number following the description. We'll do the rest.



(See Number 1)



(See Number 2)



(See Number 4)

STAPLER CUTS, FORMS, DRIVES OWN STAPLES

A self-contained stapling head cuts, forms and drives its own staples direct from coils of standard wire available from open market sources.

The heavy-duty, pneumatic stapler may be mounted vertically or horizontally on any base or frame. It can be fitted to produce staples from $\frac{1}{4}$ " to 1" max. width, or from $\frac{3}{8}$ " to $1\frac{1}{2}$ " staple leg length. Staples will penetrate a total thickness of $1\frac{1}{8}$ " allowing for clinch, in plastics, woods, fibre, etc.

The unit is designed to eliminate the need for electric motors, clutches, gear boxes and precision actuating parts.

Saranac Machine Co., Main and Thomas Sts., Benton Harbor, Mich.

Use postpaid card. Circle No. 1

QUALITY CONTROL COMPUTER CAN SAMPLE FASTENERS

A computer applies the electro-mechanical Wald theory of sequential analysis to control quality. The redesigned Model 60-D Q-trol automatically signals acceptance or rejection of product standards within set quality tolerances. It can be applied to fasteners, as well as other types of components.

The unit includes computer package and operating elements, formula-setting mechanisms, signal devices and operational controls.

Diversa Electronics Corp., 5114 W. Jefferson Blvd., Dallas, Tex.

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AUTOMATIC PRINTED CIRCUIT BOARD SOLDERING SYSTEM

An automatic printed circuit board soldering system handles single-sided boards in a wide range of sizes at speeds up to 600 finished assemblies per hour.

Requiring only one operator to load and unload the assemblies, the system

applies the flux, preheats the board, solders the assembly and cleans off the excess flux.

Radio Corp. of America, Building 15-1, Camden, N.J.

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HOPPER-FED UNIT SORTS, METERS, DRIVES FASTENERS

Automatic equipment sorts, meters and installs all types of screws, pins, bolts, rivets and studs from $\frac{1}{8}$ " to $2\frac{1}{4}$ " long No. 14 screw. The Tru-Tork operates at rates up to 7000 parts per hour.

The standard unit consists of a hopper unit with positive switch-controlled feed and standard power screwdriver, air fed at 40 lbs. pressure through plastic supply hoses.

The driver's special clamping tip allows one-hand driving, often without predrilling, effecting time savings. Fasteners are driven to a predetermined torque and the driving cadence is adjustable. Up to 12 drivers may be operated from one hopper and operators may work on a radius up to 50 ft. from the hopper with normal shop air pressure.

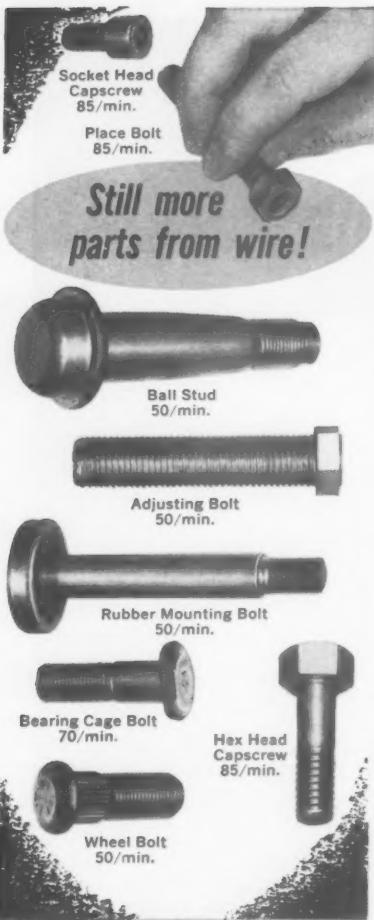
Clyde Engineering and Mfg. Corp., 937 E. 10 Mile Rd., Madison Heights, Michigan.

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COMPACT DEGREASER NEEDS NO TOTE PANS

Vibra-Bantam, a small subsonic degreaser features high production automatic in-line cleaning for all small parts, without manpower. The unit utilizes a vibrating spiral elevator to move the work rapidly through non-flammable cleaning solvents and vapors, eliminating tote pans and baskets.

Compact, 20" square with a 42" over-all height, the degreaser will process the full capacity of any screw machine, cold header or punch press. Chips are automatically separated and clean dry parts continuously emerge

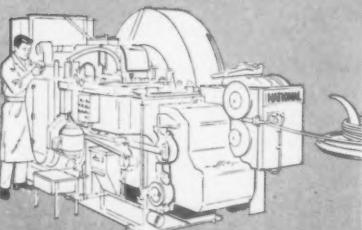


BOLTMAKERS make these interesting parts, and countless others, every day from wire.

Operations include cutting off, extruding, heading, trimming, pointing and thread-rolling.

It's just possible your metal parts can be made faster, stronger and at lower cost in Boltmakers (or in other types of Nationals).

May we help you investigate?



NATIONAL 1/2-INCH BOLTMAKER
4,200 PARTS PER HOUR!

NATIONAL MACHINERY CO.

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DETROIT

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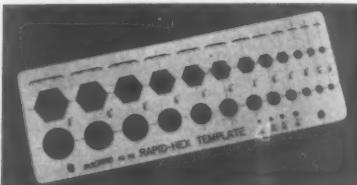
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ready for inspection. It is available with either steam or electric heat.

Manpro Corp., 1470 Hilton Road, Detroit 20, Mich.

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TEMPLATE SPEEDS DRAWING OF HEX SCREW HEADS, NUTS



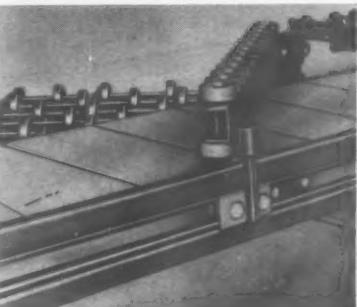
Designed to speed the drawing of hex screw heads and nuts in top and side views, No. 82 Rapid-Hex Template has a range of $\frac{1}{8}$ " to $\frac{3}{4}$ " across the flats. It contains 12 hexagons, circles and chamfer crescents.

The template is made of .030" matte finished mathematical quality plastic, with an over-all size of 8" x 2 $\frac{3}{4}$ ".

Rapidesign, Inc., P.O. Box 429, Burbank, Calif.

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REDESIGN BELT CONVEYOR FOR EFFICIENT ASSEMBLY



Lower horsepower requirements, simplified assembly and installation, a body depth one-half that of previous models, and a new belt design that permits conveyor lengths up to 500 feet, are features of a redesigned unitized all-metal belt conveyor.

In addition, the new Armorbelt conveyor features a continuous Speedbar channel on both sides of the conveyor. This channel permits the fastening of side tables, deflectors, electric controls, and other attachments at any point along the sides of the conveyor without the need for drilling. This channel can also be used to connect legs or ceiling supports at any position to suit building conditions or to clear obstructions. Items are fastened to the channel by means of $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ " or $\frac{1}{2}$ " bolts.

The $4\frac{1}{2}$ " conveyor is made in standard 10 foot sections and any number of sections may be easily connected to form a one piece conveyor up to 500 feet in length. Standard vertical curves of 5° , 10° , 15° , and 20° may be used for multi-level conveying.

M-H Standard Corp., 515 Community Ave., Jersey City 4, N.J.

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MIG WELDER HANDLES SHEET DOWN TO .030"



For MIG welds on aluminum, magnesium, stainless and carbon steel, Model CP-3-VS will weld sheets down to a thickness of .030".

Continuous slope and voltage adjustment is available for welding between the limits of 300 amp. at 30v and 25 amp. at 10v. Both spatter and burn-through are eliminated.

Miller Electric Mfg. Co., Appleton, Wisconsin.

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PORTABLE CHASSIS HOLDER AIDS ELECTRONIC ASSEMBLY



Efficiency in electronic assembly reportedly can be increased up to 50% with the use of an improved, fully adjustable, portable chassis holder.

A floor model work holder capable of holding chassis up to 30 inches square and weights up to 200 pounds, the Tronic-Hold T-300's design permits vertical and horizontal rotation through 360° , with height adjustment from 35° to 46° . Scissor clamps are available for use with chassis having no front panel.

Four rubber tread casters (available in either 3" or 5" dia.) allow heavy chassis to be moved easily from the assembly station to a test console or other remote location. Two casters have

foot operated locking mechanisms to prevent rolling.

A bench model version of the T-300 is now available where portability is not a consideration. The bench model may be rotated 360° in the vertical plane.

Flotron Industries, Inc., 1608 Centinela Ave., Inglewood 3, Calif.

Use postpaid card. Circle No. 9

ULTRASONIC SENSING UNIT FOR ASSEMBLY LINES



An automatic control and switching device uses beams of ultrasonic sound waves to count, control or monitor. Sonac is recommended for a wide range of assembly line jobs.

The basic system consists of two sensors and a control unit, working similarly to a photo-electric device. Because it doesn't have to "see" objects, it is unaffected by conditions such as vibration, dust and smoke, too little or too much light.

Aro Equipment Corp., 1949 Erie, Bryan, Ohio.

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FIVE-STAGE LIGHTING FOR PRECISION ASSEMBLY

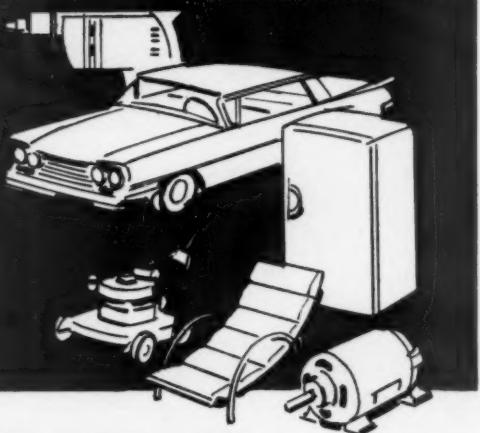


Glare-free, concentrated lighting in five stages up to 1000 f.c. is designed into a work lamp for precision assembly and inspection.

The light shaft has three joints and rotates 360° on the base. It also comes with a 7½ ft. extension cord which hooks in between the base and the lamp, permitting critical inspection of areas within large consoles.

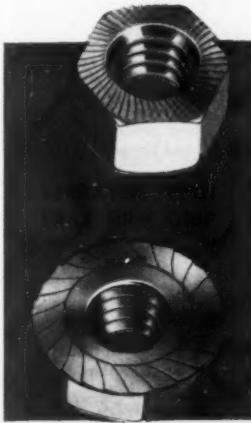
Constructed of cork for better heat

Build
better
products
with



...Better still with new
MF Whiz·Locks®

One-piece free spinners
that won't let go. So simple they'll amaze you.
So original there's a patent pending.



MacLean-Fogg's new Whiz-Lock is a one-piece, free-spinning lock nut that is simplicity itself. Spin it into place, wrench it tight and forget it. The scientifically designed spiral teeth take just the right grip on the work to prevent accidental loosening. Yet it removes readily on application of at least 25% more torque than was used to apply it.

MF Whiz-Locks have been as thoroughly tested as any new fastening device ever offered. Test them yourself soon. Samples are available free. Ask for hex nuts or bolts—with or without flange—in sizes from No. 6 to ¾". State size desired.

SEND FOR SAMPLES

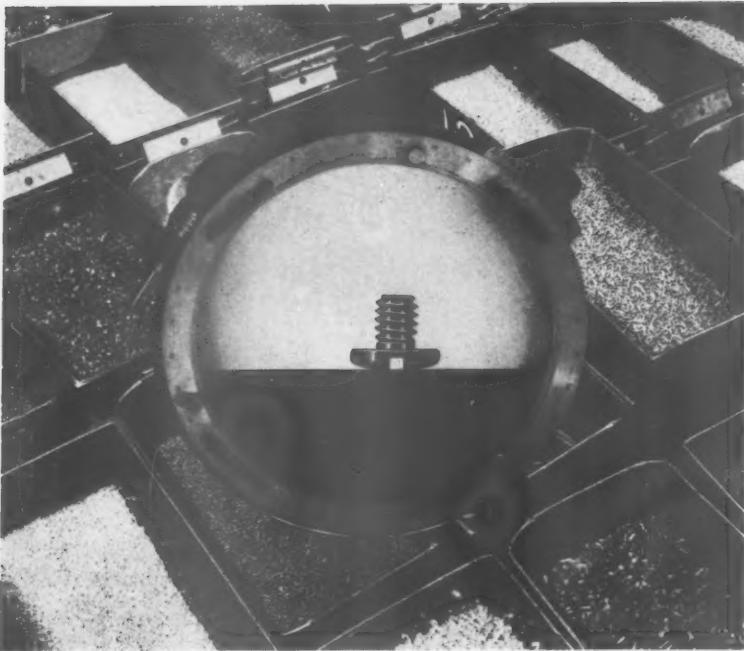
MAC LEAN-FOGG

LOCK NUTS

MacLean-Fogg Lock Nut Company
5535 N. WOLCOTT AVENUE
CHICAGO 40, ILLINOIS

1925 35 1960
ANNIVERSARY

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HUBBELL FASTENERS PASS INSPECTION AT 7 QUALITY CONTROL STATIONS

When a shipment of Hubbell fasteners leaves our Hubbell plant, everything humanly possible has been done to make those fasteners perfect in every respect. Here are the seven quality control stations that make every Hubbell fastener a finished precision product.

1. Raw materials inspected, dimensions checked, alloys tested.
2. Cold heading of blanks tested for material, quality and size accuracy. Blanks are tumbled to remove burrs and chemically cleaned.
3. After slotting, blanks are inspected for quality of cut and depth and width of slot; also for dimensional accuracy. Fasteners are again tumbled to remove slotting burrs and chemically cleaned.
4. Thread rolling operation precision checked for accuracy and fasteners chemically cleaned.
5. Secondary operations checked for dimensional accuracy and workmanship. Again chemically cleaned.
6. Plating operations checked to insure compliance with required specifications.
7. Orders inspected for quality and cleanliness prior to shipment to be sure no foreign matter is included that might jam automatic feeds. Sturdy, weatherproof containers sealed for shipment.

This quality can be your greatest production economy. For standards or specials, call Bridgeport, EDison 3-1181.



Quality **FASTENERS**

HARVEY HUBBELL, INCORPORATED
Machine Screw Department, Bridgeport 2, Connecticut

See the Hubbell Fastener Catalog in Sweet's Product Design File 7/Hu.

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dissipation, the light shade is $2\frac{1}{2}$ " in diameter and can be used with or without a magnifier.

The Model 5900 is more than four times as bright, yet only one-fifth the head size of a conventional 8w fluorescent work lamp.

Tensor Electric Development Co., Inc., 1873 Eastern Pkwy., Brooklyn, N.Y.

Use postpaid card. Circle No. 11

SMALL PARTS BINS MADE OF PLASTIC



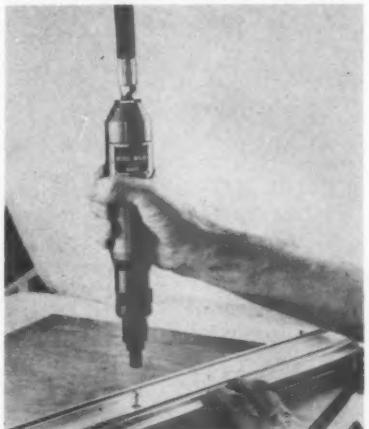
Stackbins for storing, handling and assembling of small parts have a molded card holder across the front to permit quick identification. Full flow hopper front and smooth surface facilitate accessibility of contents.

The 1 lb. plastic bins stack in any desired arrangement and can be interstacked with comparable size steel bins.

Stackbin Corp., 1155 Main St., Pawtucket, R.I.

Use postpaid card. Circle No. 12

AIR DRIVER WITH AUTOMATIC PUSH STARTING



A lightweight, air-powered combination screwdriver-nut runner features automatic push starting to speed assembly. The Model 420 operates at speeds to 3000 rpm and is a straight type unit with hand lever control.

The driver can be adapted to several types of screwdriver bits and is available with either positive or adjustable clutches.

Airetool Mfg. Co., 328 S. Center St., Springfield, Ohio.

Use postpaid card. Circle No. 13

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**UNIT METERS, MIXES
DISPENSES EPOXIES**

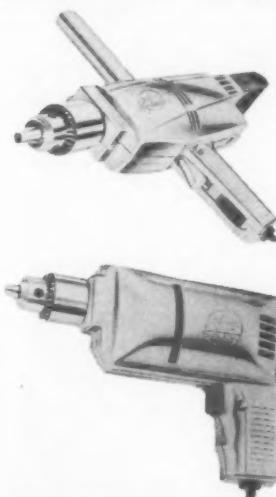


Multi-Rez-Processor proportions, dispenses and mixes multi-component reactive resins in simplifying the use of two-part epoxy and polyurethane compounds. The unit is shipped completely assembled.

Proportional accuracy of the two component media dispensed is maintained through mechanical linkage operating displacement pumps. The equipment will not freeze up, avoiding cleaning or purging problems. Only the teflon impeller enters the resin during mixing.

CPM Special Machinery Corp., 324 Butler St., Brooklyn 17, N.Y.
Use postpaid card. Circle No. 14

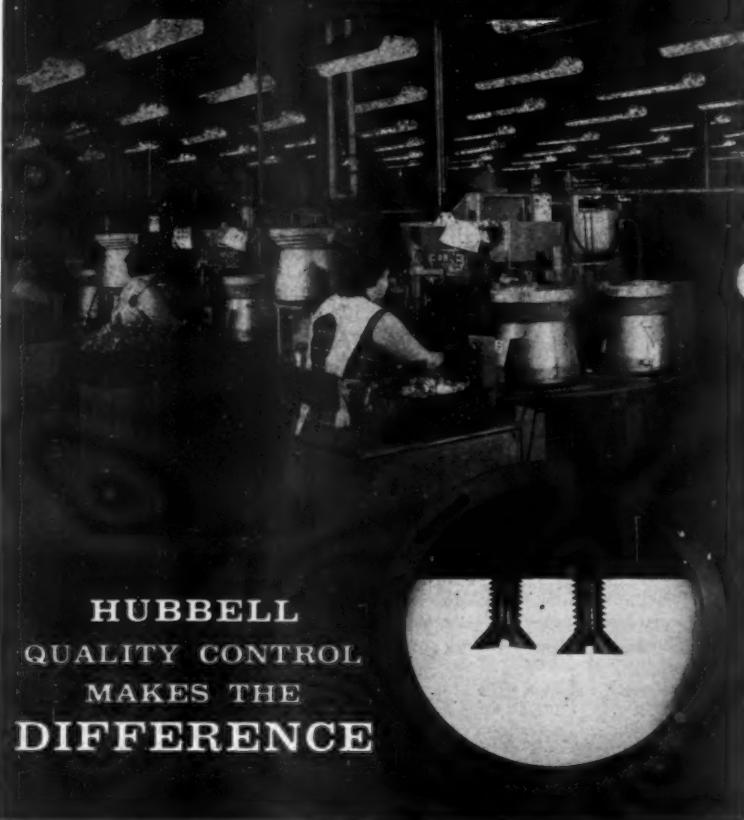
**ELECTRIC DRILLS RANGE
FROM $\frac{1}{4}$ " TO $\frac{1}{2}$ " CAPACITY**



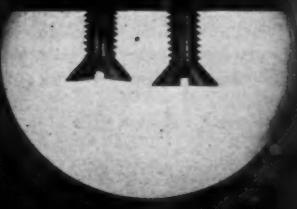
A line of job-rated portable electric drills include the No. 22 with $\frac{1}{4}$ " capacity, 3-amp rating, and no load speed of 2,400 rpm; No. 32 with $\frac{3}{8}$ " capacity, 3.1-amp rating, developing 925 rpm; No. 43 with $\frac{1}{2}$ " capacity, 6.5-amp rating, developing 600 rpm, and No. 43-R, a $\frac{1}{2}$ " reversible drill.

The Speed Drills are equipped with universal series-wound AC-DC motor, 6-foot 3-conductor lead cord, three-jaw precision geared chuck, momentary contact switch with locking pin, ball and oilite bearings, 22-bar commutator

keep 'em rolling



**HUBBELL
QUALITY CONTROL
MAKES THE
DIFFERENCE**



Without any warning, this smooth rolling production line could come to a screeching halt... all because of one imperfect fastener. You've had it happen all too often. Suddenly an automatic machine clogs and everything stops dead and stays stopped until the clogged machine can be fixed.

Hubbell precision fasteners are your best insurance against production snafus like this, because they are quality controlled at every step of manufacture to provide as uniformly perfect cold headed products as is humanly possible. It's our job to weed out the duds like

the one at left in the viewmaster above, and supply uniformly perfect fasteners like the Hubbell one at right.

Contrast the two. Note how the Hubbell fastener at right is completely free of burrs or dirt that might jam an automatic machine. Also see how sharp and clean the threads are, and how deep and precise the slot. All these things add up to faster production, less down time, fewer rejects and a better end product.

Yes, if it's easier to fasten, it's easier and cheaper to assemble. Buy Hubbell precision fasteners and see.



Quality **PASTENERS**

HARVEY HUBBELL, INCORPORATED
Machine Screw Department, Bridgeport 2, Connecticut

See the Hubbell Fastener Catalog in Sweet's Product Design File 7/Hu.

Use postpaid card. Circle No. 243

to insure efficiency, and die-cast aluminum housing.

Speedway Div., Thor Power Tool Co., 1421 Barnsdale Rd., LaGrange Park, Illinois.

Use postpaid card. Circle No. 15

30 AIR DRILLS INCLUDE 10½ OZ. MINIATURE MODEL



Thirty air drills are offered in a line including miniature, angle, close corner, 360°, 90°, 30°, twin spindle, rack feed, straight and pistol grip models.

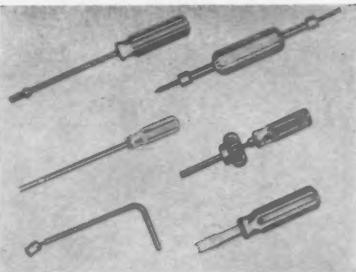
The 10½ oz. miniature SR6 model is equipped with a removable side handle and has a capacity of $\frac{1}{8}$ ".

The small diameter of Desoutter straight drills permits them to be grouped very close, down to 2" centers.

Newage Industries, Inc., 222 York Rd., Jenkintown, Pa.

Use postpaid card. Circle No. 16

DESIGN, MAKE SPECIAL HAND ASSEMBLY TOOLS



Special purpose hand tools are being designed to solve specific assembly and service problems. Screwdrivers, nut runners, pliers and wrenches are manufactured for many industries.

Working from a print or model of the parts requiring a special tool, a prototype is created for inspection and testing. Setups can be made to produce one of a kind or several thousand.

Xcelite, Inc., Orchard Park, N.Y.

Use postpaid card. Circle No. 17

FEEDING DEVICE ORIENTS DELICATE PARTS

A feeding device receives a load of small parts in random position and gently orients them on a transfer track with flat disc which rotates about an axis slightly off vertical. A specifically designed groove machined into the outer radius of the disc orients the parts.

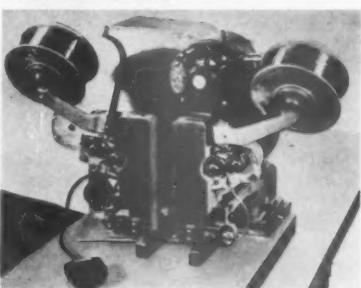
Several models of this type are capable of sorting, feeding and orienting several types and sizes of parts at the same time to feed many different machines at once.

Units are standard in 18" and 24" bins. Accessories are optional.

Aidlin Automation, Inc., 1613 E. New York Ave., Brooklyn 12, N.Y.

Use postpaid card. Circle No. 18

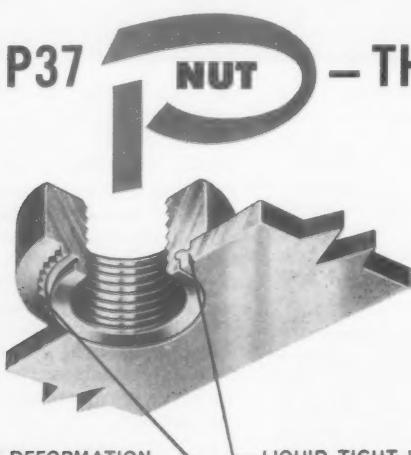
WIRE STITCHER STAPLES METAL TO 5/16"



A new adjustable dual head Wire Stitching machine which makes and inserts two staples simultaneously from coils of wire, has been developed for fastening metal up to 5/16" thickness, other materials to $\frac{3}{8}$ ". Heads can be adjusted from $3\frac{3}{4}$ " center to center of staples, to 9". The machine is portable and has a throat depth of 10".

Two coils of wire will make approximately 120,000 staples before reload-

THE P37 P-NUT - THE LATEST IN PRESS NUTS



NO WORK DEFORMATION

Serrations contain all displaced material to eliminate work buckling while shoulder prevents off perpendicular nut positioning.

HOLE PREPARATION

A single punched or standard drill size hole matches the P-Nut's pilot diameter.

VISUAL INSPECTION

When you see the shoulder bottoms on the work, you know the P-Nut is properly installed.

LIQUID TIGHT LOCK

During press-in, displaced metal flows into retaining groove of the P-NUT to assure a positive lock between the serrations and the drilled hole.

THREAD SIZES

All popular coarse and fine thread sizes from 4-40NC to 1/2-20UNF are available.

The P-Nut provides a simple, very inexpensive, method for attaining load bearing threads in thick or thin ductile sheet metal such as aluminum, mild steel and copper alloys.

P-Nuts are pressed into the work with standard hydraulic or pneumatic presses, bench vices or even driven in with a few blows of a hammer. No special installation tools are needed.

The P-Nut's excellent push-out and torque-out values assures a positive lock...especially desirable for the many vibration and repeated use applications found in the commercial, electronic and aero-space industries.

Write today for illustrated brochure.

hi-shear CORPORATION

2600 WEST 247TH STREET, TORRANCE, CALIFORNIA

Use postpaid card. Circle No. 244

Thor

Everything you want
in Multiple Nut Setters...
and more!

Speed production, multiply profit on any assembly of two to twenty-two nuts or screws. Thor multiples are custom engineered to your exact assembly situation. All fasteners are secured simultaneously to identical torque. Thor multiples can be engineered for any pattern, any product. Thor multiples are now in use in the assembly of such widely diversified products as floor mops and carburetors. Write today for Thor's complete automation manual on multiple fastener settings.

Thor Power Tool Company,
Aurora, Illinois. Branches
in all principal cities.

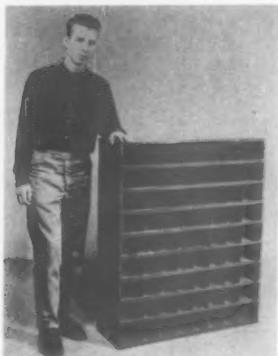


Use postpaid card. Circle No. 245

ing. The wire used is stocked in 28 different gauges of both round and flat, in standard finishes and colors. The machine can be actuated by either a foot switch or a micro-switch and is available with single trip or multiple trip clutch.

General Staple Co., Dept. "R", 28 East 22nd St., N.Y. 10, N.Y.
Use postpaid card. Circle No. 19

FASTENER BIN CONTAINS 72 COMPARTMENTS

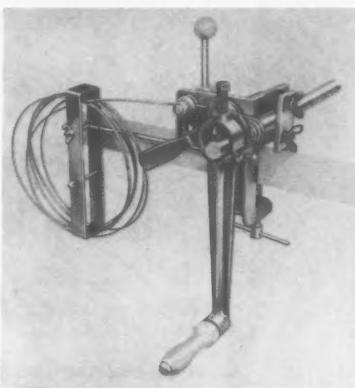


For storing a wide variety of fasteners and small parts, a bin contains 72 compartments. The heavy-duty steel bin is 42" high, 36" wide, 12" deep and each bin measures 4½" by 4½" by 12".

The Durham Mfg. Co., 210 Main St., Durham, Conn.

Use postpaid card. Circle No. 20

SPRING WINDER FOR SMALL OR PRODUCTION RUNS



Extension, compression and torsion springs are wound on Porter equipment requiring no operator experience.

Springs from $\frac{1}{8}$ " to $1\frac{1}{4}$ " inside diameter, with either right or left hand coils in wire sizes up to $3/16$ ", can be wound with this tooling. The outfit includes the P-2 winder, the Hook-Kon looping tool for forming end loops, and the Multi-Power nipper. Mandrels, spring wire coils, coil holder, wrench and winding handle also come with the unit.

Advance Car Mover Co., Inc., W. College Ave., Appleton, Wisc.

Use postpaid card. Circle No. 21

COMBINATION TOOL WITH 5 FOLD-IN SCREWDRIVERS



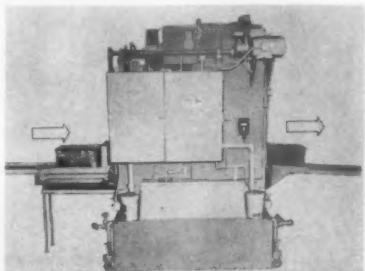
A combination tool has five screwdrivers that fold into the handle like a pocket knife. Each blade can be used straight out or at right angles for extra leverage.

The two flat blades and the two Phillips blades will accommodate most standard screws. The point awl can be used as a screw starter, scratch awl or as a center punch. No. 45 Fold Uni Drive is made of tool steel.

Eklind Tool and Mfg. Co., 2623 North Western Ave., Chicago 47, Ill.

Use postpaid card. Circle No. 22

COMPACT VERSION OF PARTS WASHING MACHINE



A Drum Jet Washer for cleaning tote boxes and small parts in volume is a compact version of a model in wide use. Drum Jet Jr. is designed to wash, rinse and dry parts in limited space shops and to supplement metal cleaning equipment in larger plants.

The unit permits parts to be cleaned and dried while remaining in tote boxes. The rotational action of the washer tumbles work without risk of damage at a rate of 20-30 tote pans of work per hour. Both possible spillage or mixing of work during processing and the need for resorting and handling are eliminated.

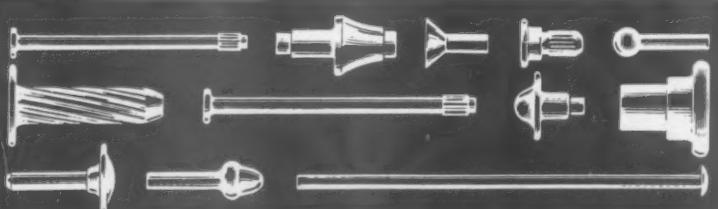
Industrial Systems Co., 31 Main St., Matawan, N.J.

Use postpaid card. Circle No. 23

STORED ENERGY POWER FOR ELECTRONIC WELDING

A 100 watt-second stored energy welding power supply has been designed for the electronic component packaging field.

Model VTW-30 delivers a step-free, adjustable range of power of .5 to 100 watt-seconds. A pulse width of less than $1\frac{1}{2}$ milliseconds assures no burn-



Job-Designed Rivets for Every Industry



Here is a fast, dependable, low cost, quality minded source of supply for JOB-DESIGNED fasteners of all types, in any

metal, to fit your own assembly problem. Assembly costs are a very major part of manufacturing expense. Most of this is labor. The fastening medium itself is usually a minimum item. If a Job-Designed fastener makes assembly simpler and faster, permits the use of fewer fasteners, allows the designer functional freedom and improves product efficiency, yours is a specifying job well done. All these

possibilities are available when you come to Hassall for design assistance and quotation on challenging, difficult or unusual rivets, threaded nails, drive screws and other cold headed parts. Short or long runs, pilot quantities, engineering counsel, over 100 years of intimate association with cold heading—and a deep appreciation for the concept of value analysis—all are part of the Hassall service to you.

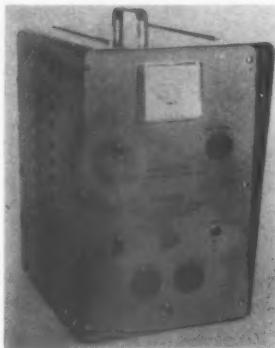
Send for a copy of our latest catalog.

JOHN HASSALL, INC.
MANUFACTURERS SINCE 1850
P. O. Box 2217 • Westbury, Long Island, N.Y.

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exactly, providing uniformity to eliminate damaged components or reject materials.

All controls and the watt-second meter are mounted high on the new vertical cabinet, allowing complete visibility and access regardless of the weld head used.

Hughes Aircraft Co., Vacuum Tube Products Div., 2020 Short St., Ocean-side, California.

Use postpaid card. Circle No. 24

DEVICE CLEANS SOLDERING IRON TIPS QUICKLY



For cleaning soldering iron tips after each use, a device consists of a sponge holder, five slotted plastic sponges and a bracket attachment to hold the tips when the iron is not being used.

Little Joe features a set of five sponges which are wetted and pressed into the holder. A $\frac{3}{4}$ " water well keeps sponges moist all day. One pass of the iron cleans the entire tip.

The unit requires less than 3 sq. in. working space and is $3\frac{1}{2}$ " in height.

Macdonald & Co., 714 E. California, Glendale 6, Calif.

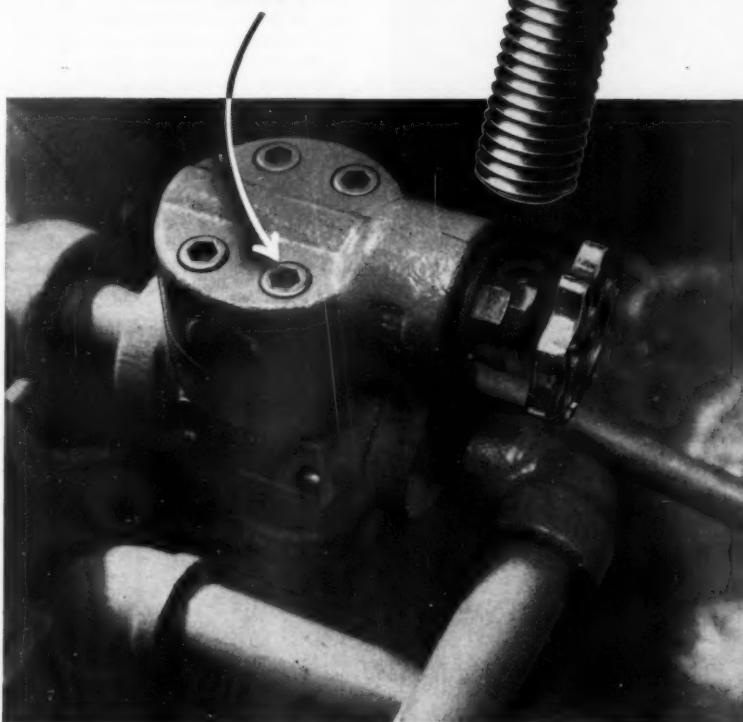
Use postpaid card. Circle No. 25

FULL-CLOSING C-CLAMP SIZES TO 12"

A new line of full-closing C-clamps in sizes up to 12" brings the total number of complete series up to 10.

There are six clamps in the series with the capacities ranging from 0-3" in the smallest clamp, to 0-12" in the largest. The minimum proof test in the series varies from 2000 pounds to 4200 pounds.

Dimensionally Controlled Heat Treatment gives Mac-it screws maximum holding power here



End-use requirement is an important factor in determining heat treatment specifications for Mac-it alloy steel screws. While physical dimensions are a prime factor, the proper combination of strength, toughness, ductility and resistance to shock and vibration must be achieved if the correct torque-tension—or holding power—is to meet your exact requirements.

Mac-it metallurgists deter-

mine a heat treating cycle that takes into consideration material, size and end use. This combination-of-three results in Mac-it screws with maximum holding power.

Every step in the manufacture of Mac-it screws is followed with care by specialists who know what you want—and want you to have it. That's why Mac-its hold tight in a tight place! Buy by name from your distributor—buy Mac-it



**MAC-IT PARTS COMPANY
DEPT. 20, LANCASTER, PA.**

MAC-IT ALLOY STEEL SCREWS

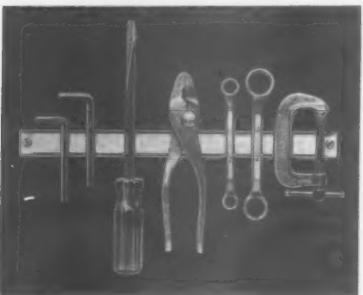
Use postpaid card. Circle No. 247

The frames are top grade malleable iron and the screws have Acme threads. All sizes have the exclusive Perma-Pad, the swivel guaranteed never to come off.

Wilton Tool Mfg. Co., 9525 Irving Park Road, Schiller Park, Ill.

Use postpaid card. Circle No. 26

HAND TOOL HOLDER IS MAGNETIZED



A magnetic tool holder can be screw-mounted to workbench, wall, shelf or other accessible spots. The 1" wide and 12" long holder is designed to retain hand tools of normal size and weight. Heavy tools require two holders.

Units are also available with magnetized backs for attaching directly to machines or other metal surfaces.

Magnetic Products Div., Jess Corp., 15770 Telegraph Rd., Detroit 39, Mich.

Use postpaid card. Circle No. 27

WELD REGULATOR ADJUSTS FOR LINE VOLTAGE CHANGE

A voltage-compensating regulator for resistance welding control will keep the welder heat within plus or minus 2% of the preset value despite line voltage changes ranging from minus 20% to plus 10%.

The voltage sensitive regulator is usually the most economical method of keeping weld quality high when the power system is subject to voltage variations. It does not correct for welding load or reactance changes.

The regulator is a plug-in unit, supplied with or without an enclosure for connection to the phase shift heat control of the welder. It regulates the firing of the ignitron contactors to maintain a constant root-mean-square heating value for each half-cycle pulse to the welding transformer primary. Speed of correction is 2 or 3 cycles.

General Electric Co., Schenectady 5, New York.

Use postpaid card. Circle No. 28

ASSEMBLY INSTRUCTIONS VIA TAPE RECORDER

Step-by-step assembly instructions can be pre-recorded on tape and heard by operator with standard headset, external loud-speaker or special inductive portable receiver.

Audio Instructed Mfg. Operation permits instructor to record information in "blocks" which can be reviewed

by operator by touching backspace control with foot which automatically "rewinds" tape as far as desired.

Portable receiver available as small as cigarette lighter, permitting freedom



of movement in job area. It uses three transistors, one hearing-aid-type mercury cell battery and equipped with listening device.

Dicaphone Corp., 11 Third St., New York 3, N.Y.

Use postpaid card. Circle No. 29

Fastening Costs Too High?

SET MULTIPLE EYELETS AUTOMATICALLY

ON MACHINES BY

Edward Segal





You can do many fastening operations faster and more economically on Edward Segal Automatic Eyeleting Machines. Faster because a number of eyelets can be set simultaneously and rapidly. More economically because of the low cost of eyelets. And Segal machines are designed to give dependable, neat fastenings every time.

Let us study your fastening problem. We can supply equipment with just the right tooling and degree of automation for your operation. Write for details to section AFE-II.

EDWARD SEGAL • 132 LAFAYETTE STREET, NEW YORK 13, N.Y.
MFRS. OF EYELETING MACHINERY, SPECIAL HOPPERS & FEEDING DEVICES

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For Stud Setting and Pulling and TORQUE CONTROL TOOLS

"Titanforker" Controlled Torque Driver



For variety of torque uses. Audible signal when desired torque is reached. Easy adjustment. Four sizes: maximum torques from 75" lb. to 225" lb. Female adapters in driving head; male adapters on torque base.



Controlled (Torque) Drive Stud Driver

Predetermined amount of torque can be applied to stud during driving. Simply adjusted by two Allen screws in spring adjusting nut—downward, increased torque; upward, decreased torque. For use with any air or electric drill or drill press. Sizes #101—#102—#103.

"Bull Dog" Stud Driver Designed for Use With Impact Wrenches



Built for rugged use on heavy engines. Equipped with Titan Design, Loose Pressure Plunger. Definitely stands up under vibration encountered when using an impact wrench for motive power.



Titan "Roll Grip" Combination Stud Driver and Puller

Incorporates roll action to grip as little as $\frac{1}{2}$ in. of unthreaded body of stud. Made in standard sizes from $\frac{3}{16}$ to 3 in. inclusive.



World's Largest Producers Of Stud Drivers And Pullers

TITAN TOOL CO.

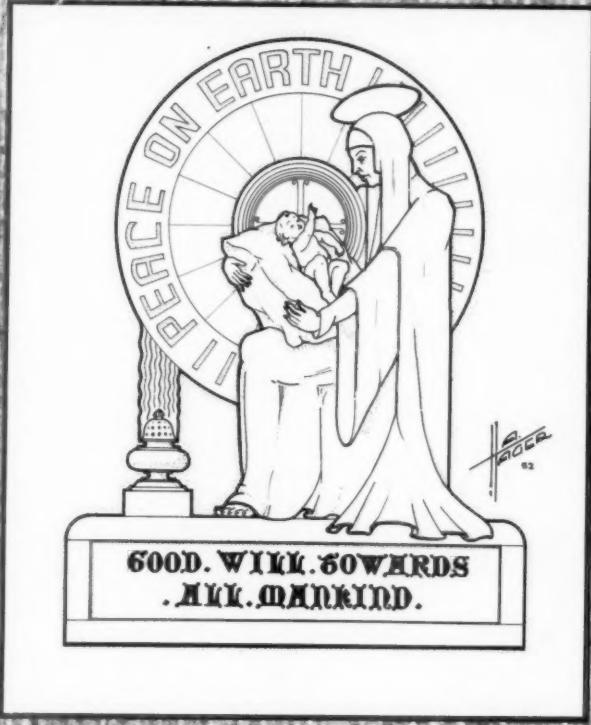
47 MAIN ST., FAIRVIEW (ERIE COUNTY), PA.

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Assembly and Fastener Engineering

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ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois



ORIGINAL DESIGNS

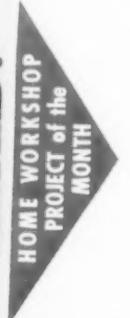
NOVEMBER 1960

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JIM FLY ST. ROCKFORD, ILL.

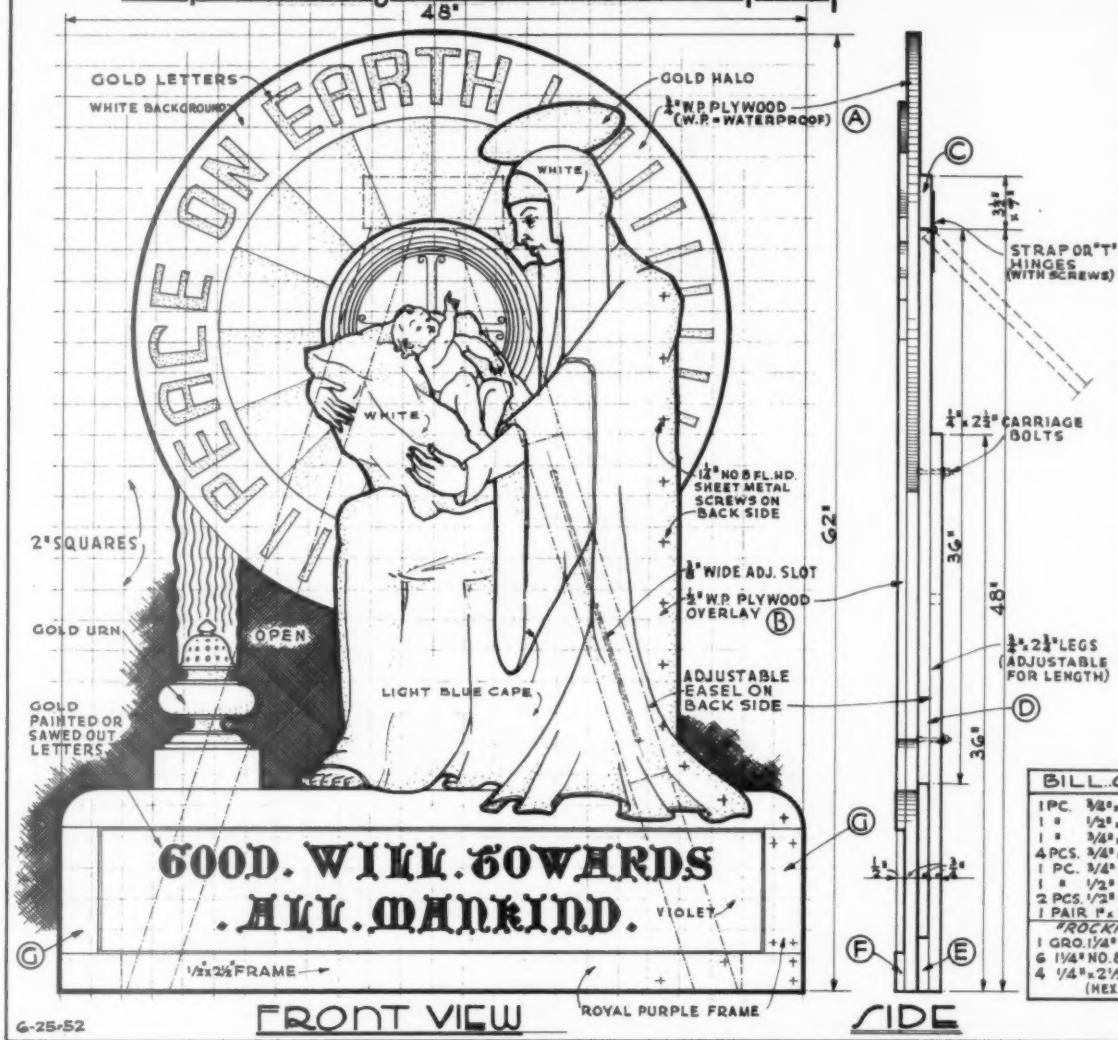
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ROCKFORD SCREW PRODUCTS CO.

Rockford, Illinois



"Symbol...of..Christmas" Display



6-25-52

FRONT VIEW

SIDE

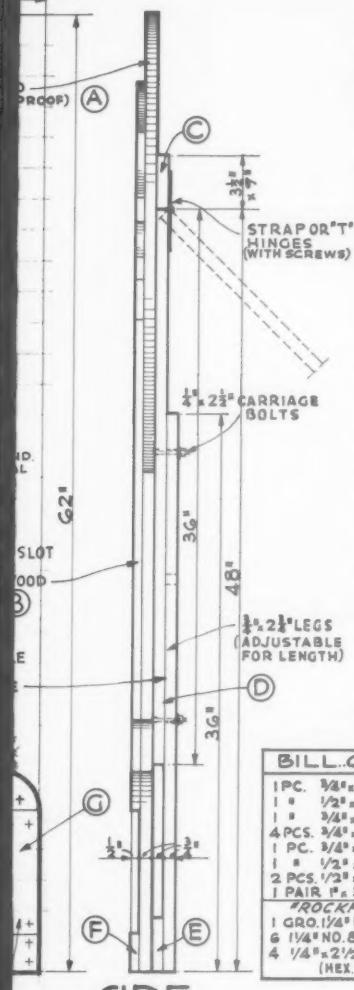
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1 PC. $\frac{3}{4}^{\text{in}} \times 4^{\text{in}} \times 8^{\text{in}}$
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 1 PAIR $1^{\text{in}} \times 3^{\text{in}} \times 1^{\text{in}}$

ROCKFORD
 1 GRO. $\frac{1}{8}^{\text{in}} \times 9^{\text{in}} \times 8^{\text{in}}$
 6 $1\frac{1}{4}^{\text{in}} \times \text{NO. 8 FLAT H}$
 4 $\frac{1}{4}^{\text{in}} \times 2\frac{1}{2}^{\text{in}} \times \text{CARRI}$
 (HEX DR WING)

lary



Season's Greetings to You All:

- IT IS WITH THIS WISH THAT WE SINCERELY HOPE THAT IN THE VERY NEAR FUTURE, AS A NEW YEAR DAWNS... TIME WILL BE.. WHEN OUR TROUBLES AND NERVOUS TENSIONS OF WORLD CONDITIONS EXISTING TODAY WILL BE ELIMINATED. THRU GREED, DISTRUST, SELFISHNESS AND PREDUDICE, MAN HAS BEEN THE SPOILER OF GOD'S PERFECT CREATION. WE CAN STILL AVOID FURTHER CHAOS BY UNITING OURSELVES IN A PLEDGE OF DEVOTION AND CONSIDERATION FOR ONE ANOTHER.. WITH AN ABUNDANCE OF SPIRITUAL FAITH TO GUIDE US.
- LET US ALL BEGIN BY SETTING ASIDE OUR MATERIAL GAINS AND POSITIONS WHICH WE CONSIDER SO IMPORTANT FOR JUST ONE DAY.. TO PAY HOMAGE TO HIM "WHOSE BIRTHDAY WE CELEBRATE NEXT MONTH"
- IT HAS BEEN A PRIVILEGE FOR ME TO DESIGN AN APPROPRIATE DISPLAY FOR THIS CHRISTMAS. IT IS DRAWN OF A MODERN CONTEMPORARY NATURE FOR EASY LAYOUT AND PAINTING. FOR COLOR SUGGESTION FOLLOW DRAWING.
- IF DISPLAY IS MADE FOR OUTDOOR USE, WATERPROOF PLYWOOD SHOULD BE USED. DISPLAY MAY BE USED EASEL TYPE AS DETAILED, OR HUNG.
- MAKE PROJECT FOR YOUR HOME, CHURCH, CLUB, SCHOOL OR PLACE OF BUSINESS AS AN EXPRESSION OF YOUR FAITH IN CHRIST JESUS AND CONFIDENCE IN YOUR FELLOW MAN. IT WOULD BE APPRECIATED BY YOUR CHURCH TO RECEIVE THE "SYMBOL OF CHRISTMAS" DISPLAY. IF YOU ARE NOT ABLE TO MAKE THE DISPLAY YOURSELF, YOU LOCAL SIGN-PAINTER CAN.

*May Peace abide with you.. and may
the New Year bring you health, happiness
and prosperity*

Heerman A. Hager
Creator of

Hobby-neering

SERIES.. NO.10

PROJECT
9

Designed
by
A. Hager
OF
ROCKFORD

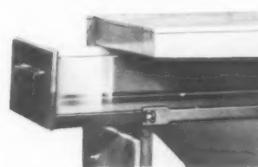
BILL OF MATERIALS.

| | | |
|--------|---------------------------------|---|
| 1 PC. | 3/8" x 45" x 51/2" PLYWOOD | A |
| 1 " | 1/2" x 41" x 41" " | B |
| 1 " | 2 1/2" x 3 1/2" x 9" PINE CLEAT | C |
| 4 PCS. | 3/8" x 3 1/2" x 31/2" LEGS | D |
| 1 PC. | 3/4" x 3 1/2" x 31/4" TIE | E |
| 1 " | 1/2" x 2 1/4" x 41" FRAME | F |
| 2 PCS. | 1/2" x 2 1/4" x 8" " | G |
| 1 PAIR | 1/2" x 3" HINGES (WITH SCREWS) | |

ROCKFORD SCREWS & BOLTS

1 GROS. 1/4" NO. 8 FL. HD. TYPE A SHEET METAL
6 1/4" NO. 8 FLAT HEAD WOOD SCREWS
4 1/4" x 2 1/2" CARRIAGE BOLTS WITH NUTS
(HEX. OR WING) & WASHERS.

USE FOR COMMERCIAL
PURPOSES IS STRICTLY
FORBIDDEN



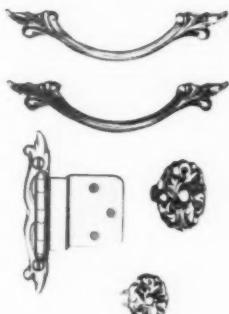
Manufactured by:
AMEROCK CORP.

THERE AND EVERYWHERE with "ROCKFORD" Screws and Bolts *



MODERN PROVINCIAL

BY **Amerock**



A distinctive NEW cabinet hardware design . . . exciting and modern, yet with the grace and elegance of period styling.

DRAWER SLIDES

Add free-wheeling convenience to every drawer in the house. Available in variety of sizes and styles to fit every application.

Easily supports loads up to 50 pounds.

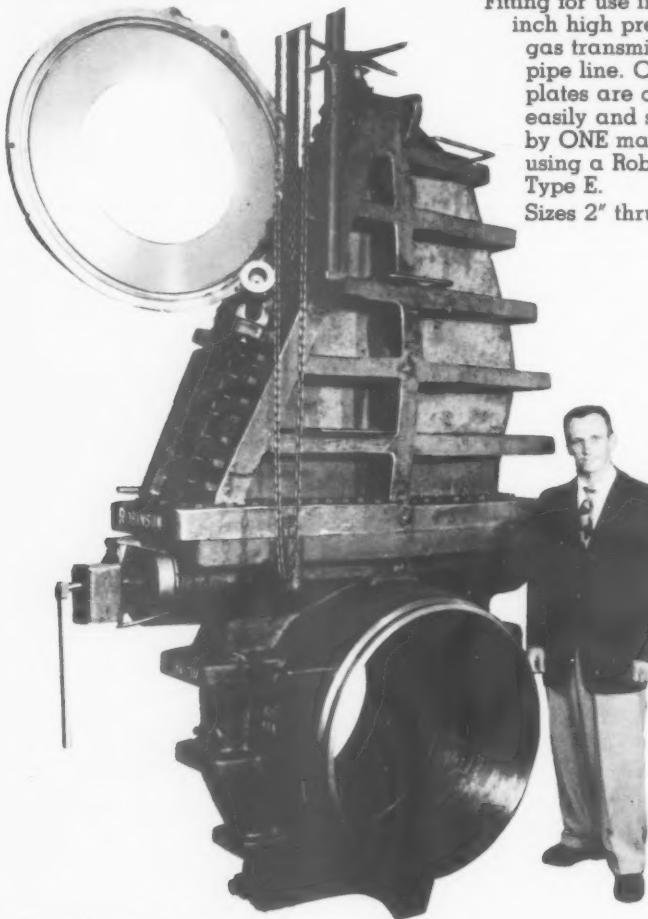


ured by:

K CORPORATION, Rockford, Illinois

* HERE THERE AND EVERYWHERE with "ROCKFORD" Screws and Bolts *

GAS FROM TEXAS



The largest Orifice
Fitting for use in 34
inch high pressure
gas transmission
pipe line. Orifice
plates are changed
easily and safely
by ONE man when
using a Robinson
Type E.
Sizes 2" thru 34"

Manufactured by:

ROBINSON ORIFICE FITTING COMPANY
2830 Lugo Street
LOS ANGELES, CALIFORNIA

P.O. BOX 17216
HOUSTON 31, TEXAS

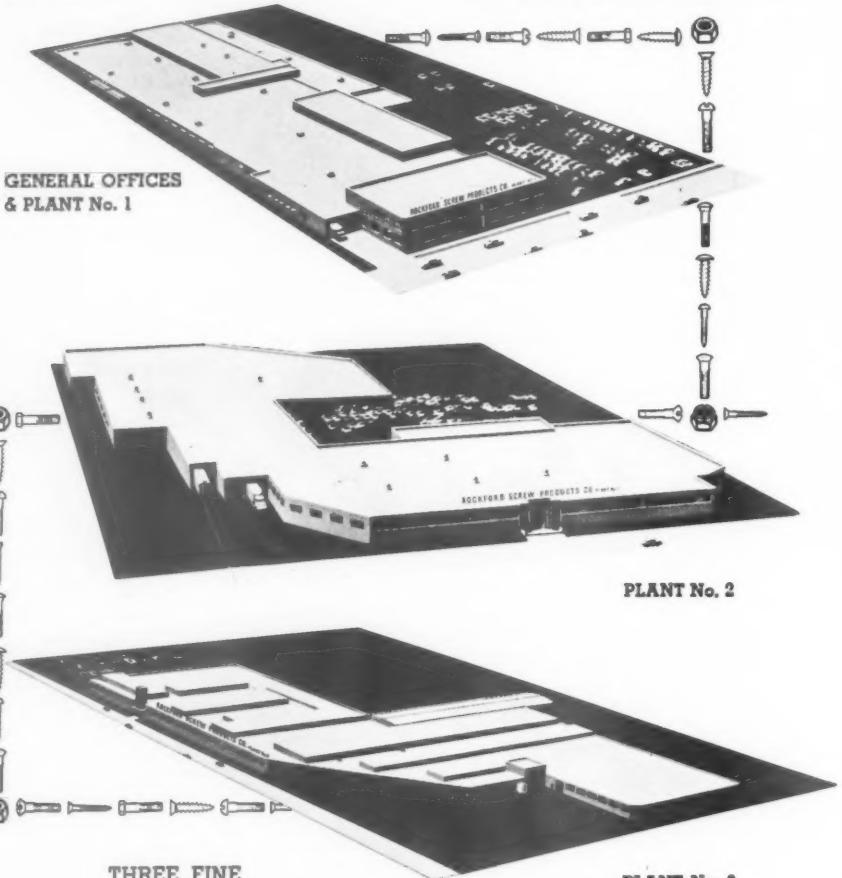


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"ROCKFORD"
Screw Products Co.
2501 NINTH STREET - ROCKFORD, ILL.

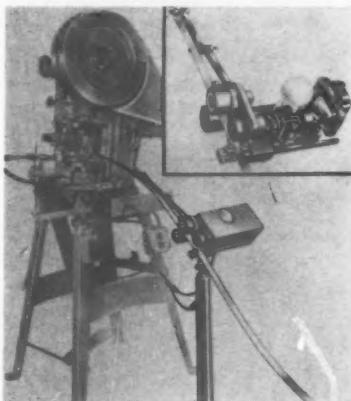
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ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

GENERAL OFFICES
& PLANT No. 1



THREE FINE
MODERN PLANTS
PRODUCING "ROCKFORD" QUALITY CONTROLLED
THREADED FASTENERS FOR AMERICAN INDUSTRIES.



**PORTABLE MACHINE STOP
MINIMIZES DOWN TIME**

Feed-Off, a completely mechanical machine stop, is designed for use on punch presses and other types of machinery.

The portable device stops machines instantly if the length of stock per stroke drops below a preset minimum, if stock varies in thickness, if defects such as burrs and tears occur in stock and when the stock coil end approaches. Stop action increases die life, minimizes down time and will allow more machines to be run at a higher rate of speed with fewer operators.

Rands Products, Inc., Dept. 4K, Willimantic, Conn.

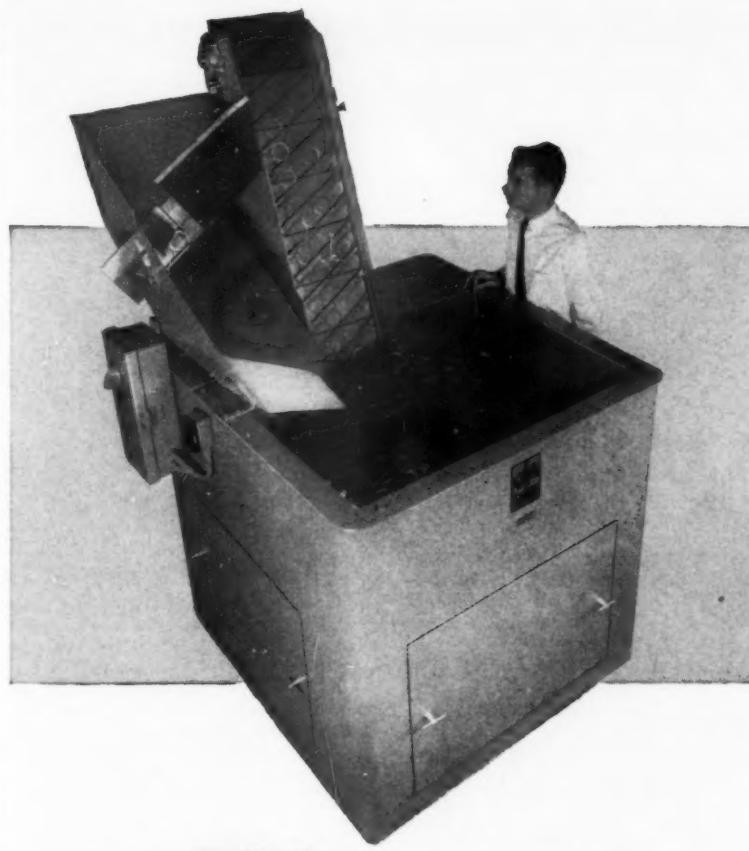
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**VACUUM PARTS HANDLER
NOW PACKAGED UNIT**

A portable vacuum unit consisting of transducer and probe for handling small parts is now packaged complete. It formerly had to be assembled by company engineering departments.

The Bazooka unit weighs less than 5 lbs. The transducer converts compressed air into the vacuum, which is sufficient to handle more than one probe. The unit also contains an air regulator, gages, filter and needle valve for shut off.

The Air-Vac Engineering Co., Inc.,



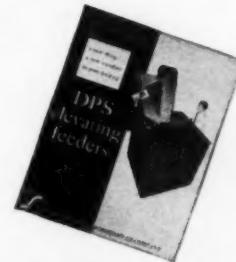
How DPS elevating feeders elevate, orient, feed your parts to cut production costs

New elevating feeders from Detroit Power Screwdriver Company—

- Eliminate hand feeding
- Permit high-speed feeding and orienting
- Discharge parts at height to suit your requirements
- Offer adequate holding capacity

The output of hand-fed production machinery soars with DPS elevating feeders. Parts of almost any size, shape and material can be fed quickly, gently, in a continuous flow to other machinery for processing and assembly.

Three standard sizes available: 6, 12 and 20 cu. ft. holding capacities. Larger or smaller units can be fabricated to meet special requirements.

**NEW BULLETIN**

. . . has complete information on new DPS elevating feeders. Mail the coupon today!

15,333



A Subsidiary of
Link-Belt Company

DETROIT POWER SCREWDRIVER COMPANY

2815 W. Fort St., Detroit 16, Michigan

Send new Elevating Feeder Folder 2812.

NAME _____

FIRM _____

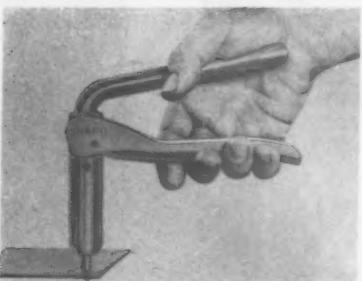
ADDRESS _____

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Old Stratford Rd., Box 27, Shelton,
Connecticut.

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**REDESIGNED RIVET GUN
HAS AUTOMATIC EJECTION**



Redesigned for automatic jam-proof operation and ease in handling, the Snapo rivet gun is for blind applications.

The new gun automatically ejects the mandrel (nail) after the rivet has been set and is one-half the size of the previous model. Its thin nozzle permits use in confined areas.

Rivets are inserted and crimped from the same side, pulled together with up to 1500 lbs. of force. Countersunk heads leave a flush surface.

The Richline Co., Inc., 1527 E. Franklin Ave., Minneapolis, Minn.

Use postpaid card. Circle No. 32

**VIBRATORY TUMBLERS FOR
PARTS FINISHING**



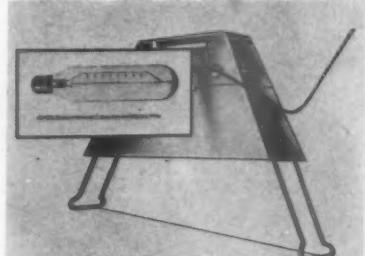
Vibratory barrel tumbling machines have electromagnetic vibratory drives for deburring, cleaning, descaling or other parts finishing jobs.

Amplitude of vibration can be instantly varied, while the same frequency of 3600 vibrations per minute is maintained. The self-contained units come in three models with 4, 1 and 6 cu. ft. capacities.

Syntron Co., 820 Lexington Ave.,
Homer City, Pennsylvania.

Use postpaid card. Circle No. 33

**GUIDE LINE LIGHT FOR
ASSEMBLY OPERATIONS**



A new guide line light projects especially sharp shadow lines to guide cutting, marking or assembly operations. The Q-15 is equipped with a 1500w bulb $\frac{3}{8}$ " in diameter with a burning life of 2000 hours.

A specially-designed reflector increases the lumen output to deliver marking lines in a pattern 18" to 22" wide with a useful length of 12' to 24'. The unit can project any desired number of parallel straight shadow lines, square or rectangles, or can project a single white line for use on dark materials.

Carter Products Co., Inc., Helmer Bldg., Grand Rapids, Mich.

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**ANGLE NUTSETTERS WITH 3
TYPES OF END SOCKETS**



Angle nutsetters are available with three types of end sockets: single-end, double-end and built-in flush socket types.

Safe-Torque clutches are available in the single-end and built-in flush type sockets. With these clutches, the 16C-5 nutsetters offer close limit torque control with no torque reaction.

Exhaust noise is at a low level due to a new muffling technique. The unit's handle may be rotated to locate the control lever in the best operating position. Flush grease fittings and smooth contours are added features.

Gardner-Denver Co., Quincy, Ill.

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Let

NATIONAL RETAINING RINGS

simplify
your
designs!

National Retaining Rings have effected important economies in a wide range of applications from heavy duty machinery to toys. Elimination of machining, threading, nuts and cotter pins are typical advantages. In many applications, reduced space and weight requirements and substantial savings in material can be accomplished with these easy-to-install retaining rings.

TYPICAL APPLICATION

National Retaining Rings improve design of this electronic coupling. Assembly is faster, easier—saves time and money.

ENGINEERING ASSISTANCE

Send drawings or sample parts for suggestions on your specific design problems or write for illustrated literature on these cost-cutting retaining rings.

The NATIONAL LOCK WASHER COMPANY
Serving Industry Since 1886

NEWARK 5, NEW JERSEY • MILWAUKEE 2, WISCONSIN

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Answer to problem on page 58.
If X equals Horace's wife's present age and Horace's former age, and Y equals the interval of time elapsed and the difference between the two ages, the solution $X = 18$ can be easily found.

**BEARING HANDLING TOOLS
AND INSTRUMENT ASSEMBLY**

Bearing handling tools for instrument assembly eliminate hand handling of the part and possible brinelling.

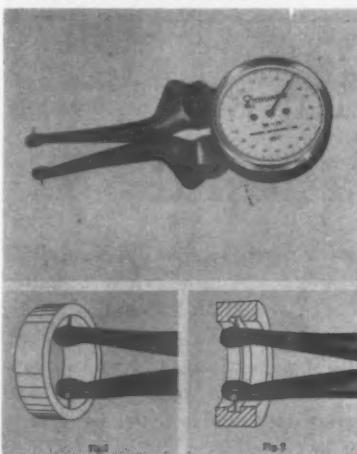
Spring-release mechanical action provides one-handed operation in picking up and releasing bearings. Pressure is uniformly distributed on the appropriate outer or inner race, never on balls, avoiding the danger of brinelling.

Bearite tools have steel collets of varied design for handling bearings in cavities as well as on shafts.

EAM, Inc., Skippack, Pa.

Use postpaid card. Circle No. 36

**READ GROOVE-BORE GAGES
DIRECTLY FROM DIAL**



Direct-reading, caliper-type dial-in-indicator groove and bore gages are available in four sizes to accommodate diameters from .40" to 3". The Truarc gages are calibrated in graduations of .001" or .0025", depending on size, and have a reach of 2 1/8".

Gages are equipped with replaceable needle-type contact points.

Unlike zero-setting gages, which must be adjusted for each piece to be measured, the instruments provide a direct reading on the indicator dial. They have a shock-proof, jeweled movement and unbreakable crystal.

Retaining Ring Div., Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N.Y.

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Are you designing to series 60 standards? If so, specify Bristol.



**This DOUBLE-DIAMOND knurl
marks the BRISTOL "Series '60"**

The cap screw that holds more... indents less... wrenches tighter than ever before... meets or exceeds all new "Series 1960" standards of Socket Screw Manufacturers' Committee. Of course, regular Bristol "Series 1936" standard screws are still available in hex or Bristol Multiple-Spline.

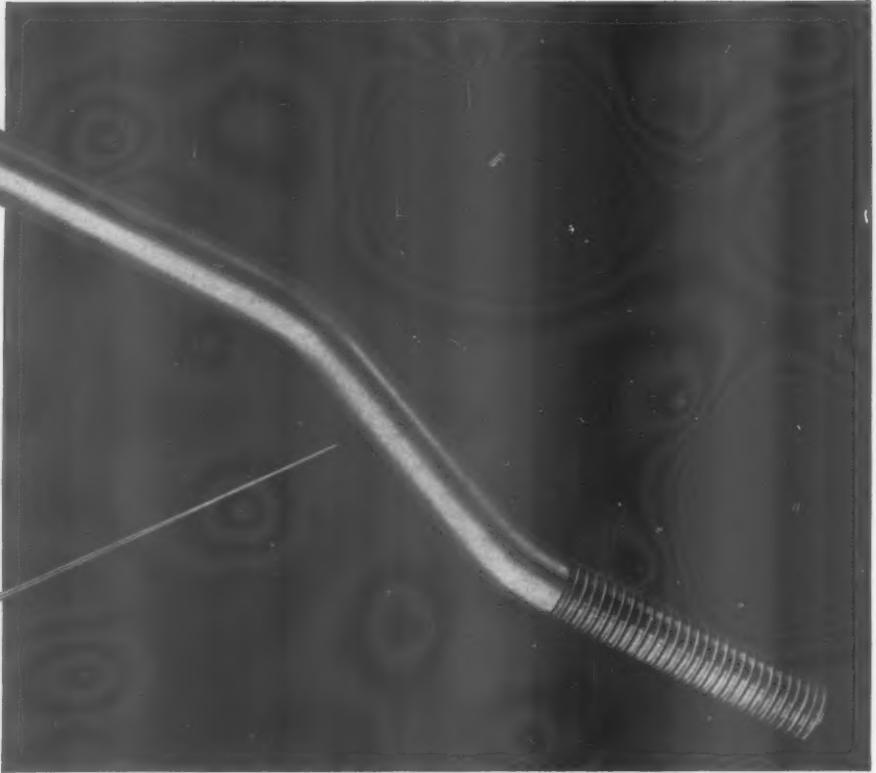


*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1 1/2" diameter.

THE BRISTOL COMPANY Socket Screw Division Waterbury 20, Conn.

Use postpaid card. Circle No. 232

NAT'S
quick facts
about
Fasteners...



Shining example...of big things in specials by National

This is a large offset eyebolt, shown here big as life. We designed and made it to order for one of our customers.

To begin with, it shows that we can and do make some sizable things in the way of cold headed Special Products.

But there's more here than seems to meet the eye.

When our customer brought us this eyebolt, he had been having it made as a forged eye welded to a machined bolt, with a cut thread.

We gave it some thought, then made it...with a difference. We cold formed it in one piece, and rolled the thread...turning out a stronger, more practical, and more efficient part, and lopping off costs all along the line.

And there's the real point...what we

really mean when we mention doing BIG things in Specials, at National...better parts, large or small, at lower cost, by cold heading and designing for profit.

We do it right along, and we can very likely do it for you, too. Want to find out? Just drop a note to Special Products Service, at our address*. And if you just happen to have a Special problem, tell us all about it—and let us help.

*It will bring you this illustrated booklet "Bring your Special Problems to National", 16 pages about Specials as National sees them.



The National Screw & Mfg. Company • Cleveland 4, Ohio

California Division, The National Screw & Mfg. Company • 3423 South Garfield Avenue, Los Angeles 22, California

Use postpaid card. Circle No. 253

WHAT'S NEW IN FASTENING AND JOINING

For further information on any of the fasteners listed here,
use the handy postpaid card opposite page 78.



(See 40)

PLASTIC-CAPPED BOLTS RESIST CORROSION

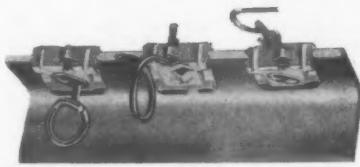
Bolts are being capped with a rubber-resin plastic that resists cold flow when squeezed under a heavy load. This capping method extends bolt life under high-rust or chemically-corrosive conditions.

Although just a fraction of an inch of this plastic is molded over the bolt head, it has proved strong enough to resist over 30 lbs of torque.

The bolts are now being used in glass-lined steel silos and are applicable for use in wiring devices, steel components, and any application where rust or corrosion is a special problem.

Clear-Cite Products, 1323 Webster Ave., Chicago, Ill.

Use postpaid card. Circle No. 40



(See 41)

B-BEAM CLIP FITS FLANGES $\frac{1}{8}$ " THRU $\frac{1}{2}$ "

A B-beam clip is designed for use with threaded or unthreaded bridle rings, drive rings and other low voltage cable, wire and copper thermostatic tubing supports.

The clip will fit any flange from $\frac{1}{8}$ " through $\frac{1}{2}$ " thickness regardless of flange taper. Recommended maximum load limits: horizontal pull, 30 lbs., vertical pull, 50 lbs.

Erico Products, Inc., 2070 E. 61st Pl., Cleveland 3, Ohio.

Use postpaid card. Circle No. 41



(See 42)

MINIATURE STANDARD ELECTRONIC CHASSIS LATCH

A latch is designed specifically for the small $5\frac{1}{4}$ " standard electronic chassis drawer. This latch is a small version of the standard size known as Gripwell.

The double safety latch provides positive latch action, plus positive locking action. These safety features prevent accidental openings of the drawer under any condition. The latch provides a $6\frac{1}{2}$ to 1 mechanical advantage for positive injection and rejection of the drawer and also allows for $\frac{1}{2}$ " of travel or take-up.

The latch housing, which is shaped to fit the contours of the hand, can be used to carry the drawer, irrespective of the position of the latching handle. Over-all size of the latch is 4.7" and extends 1.4" from the face of the chassis drawer. Installation requires two drilled or punched holes.

The Hartwell Corp., 9035 Venice Blvd., Los Angeles 34, Calif.

Use postpaid card. Circle No. 42

NEW PLATING METHOD FOR SPRING LOCK WASHERS

Spring lock washers incorporate the Dyko metal plating process for increased protection. The mechanical process was developed by Minnesota Mining and Mfg. Co.

Two specific benefits are a thicker coat of plating (.0003" min.) and complete elimination of the possibility of hydrogen embrittlement since the plating method is non-electrolytic.

Mellowes Co., 125 E. Nash St., Milwaukee 12, Wis.

Use postpaid card. Circle No. 43

EPOXY GLUE FOR UNIVERSAL BONDING

An epoxy glue is used for bonding steel, aluminum, brass, copper, iron, glass, wood, pottery, porcelain, masonry, plastics, china and leather. The adhesive is waterproof and transparent.

Packaged in two tubes, a resin and hardener, the adhesive is available in bulk quantities on special order. A mixing pan is included with each order.

Magic Iron Cement Co., Inc., 14215 Caine Ave., Cleveland 28, Ohio.

Use postpaid card. Circle No. 44

ADHESIVE OFFERS HIGH PEEL STRENGTH

Hysol 10-001 offers peel strength of 63.3 in.-lbs. on aluminum to aluminum, tensile shear strength of 3300 psi, a 3-4 day pot life and 45% elongation.

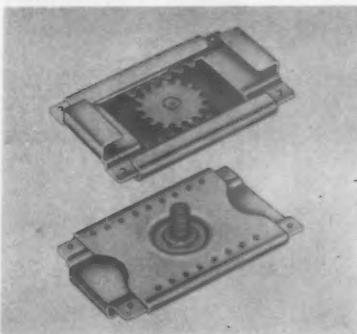
This new two component adhesive is recommended for bonding aluminum

honeycomb panels, ferrous metals, ceramics and glass.

Hysol Corp., Olean, N.Y.

Use postpaid card. Circle No. 45

FLUSH-MOUNTING STUD FOR ELECTRICAL FIXTURES



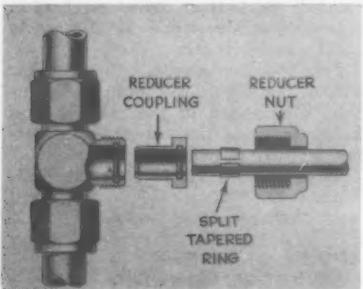
Zip-Cleat, a fastener for flush mounting junction boxes, conduit, lighting fixtures, tubing, etc., to exposed bulb Ts is a self-centering stud. It fits all standard size bulb Ts and mounts flush to the beam.

The expansion and contraction of the fastener is controlled by gear action incorporating a positive locking feature. It is operated by the thumb and forefinger. The stud is rated at 150 lb. static load with an ample safety factor.

The Wm. H. Hall Co., Winsor Locks, Connecticut.

Use postpaid card. Circle No. 46

O-RING-SEAL REDUCER COUPLINGS IN STAINLESS



O-ring seal reducer couplings are available for the first time in a full range of sizes in stainless steel, cadmium plated steel or with black phosphate and special finishes.

The seal simplifies hydraulic, vacuum and pneumatic systems by reducing or increasing tube size as necessary at various points of the system. It consists of a standard fitting plus a reducer coupling with nut and split tapered ring.

The reducer is applicable to tubing of any thickness and can be disassembled and reused any number of times. In assembling, wrench torque is unnecessary because the effectiveness of the seal does not depend upon nut tightness.

Lenz Co., 3301 Klepinger Rd., Dayton 1, Ohio.

Use postpaid card. Circle No. 47

NEEDLE-POINT SCREWS ELIMINATE PRE-DRILLING

The need for pre-drilling holes is eliminated by a special line of screws developed for aluminum windows, doors, awnings, carports, and patio columns.

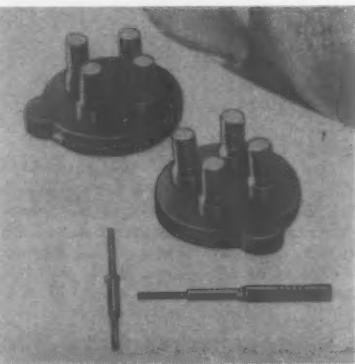
The screws are available in various head styles—acorn washer heads, indented hex heads, Phillips and slotted heads. All have an extremely hard needle point. A minimum of pressure is required to drive the screws into the metal.

Uni-Point screws are made of bright hardened Type 410 stainless steel, which combines high strength and corrosion resistance under all atmospheric conditions, as well as other metals.

Universal Screw Co., 2401 Brummel Pl., Evanston, Ill.

Use postpaid card. Circle No. 48

MINIATURE SOCKETS FOR PRINTED CIRCUITRY



Lead wires as small as .004" in diameter are accepted and held securely in miniature sockets. Sockets are mounted in printed circuit boards by staking or dip soldering, which eliminates hand soldering operations, and completely precludes heat damage to semiconductor components.

Accommodating diodes, transistors, subminiature vacuum tubes, capacitors and resistors, these sockets retain their holding power throughout many insertions and withdrawals. Flexibility in installing miniature plug-in components is greatly increased.

Sockets accept .010" to .060" diameters as standard, down to .004" on special order. Four hundred units will fit into an area of 1 square inch.

The Tran-Grip embodies a new design in a closed-entry, multiple-spring, contact-gripping device. A beryllium copper spring shaped like an hour glass grips the lead securely from 2 sides. The spring is virtually immune to damage in that it will not admit too large a lead, and is self-aligning when admitting the lead.

Units are supplied as individual sockets, or two or more are spaced on

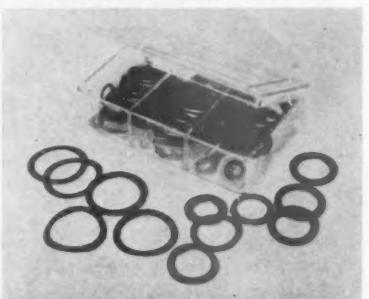
a mounting to fit any standard arrangement, including JEDEC.

The socket is also designed to be used as a miniature and microminiature connector. In conjunction with a series of coordinated pin designs almost any special connector may be built with a minimum of effort. With Tran-Grip insulators these units may be mounted in a metal panel but still be isolated electrically.

Omega Precision, Inc., 757 N. Coney Ave., Azusa, Calif.

Use postpaid card. Circle No. 49

NYLON THRUST WASHERS IN INTRODUCTORY KIT



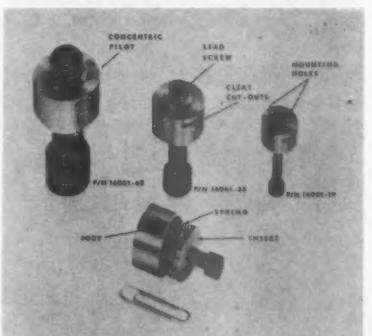
Nylon thrust washers—a molybdenum disulfide filled nylon formulation—are now offered in an introductory utility kit. The kit contains over 100 washers in 39 sizes of 1/64", 1/32" and 1/16" thickness.

The Nylatron GS washer is of uniform properties, free of flash lines and stress spots. It is designed for applications where the greatest wear resistance is required under light thrust conditions.

Hardware Designers, Inc., Box 4, South Hackensack, N.J.

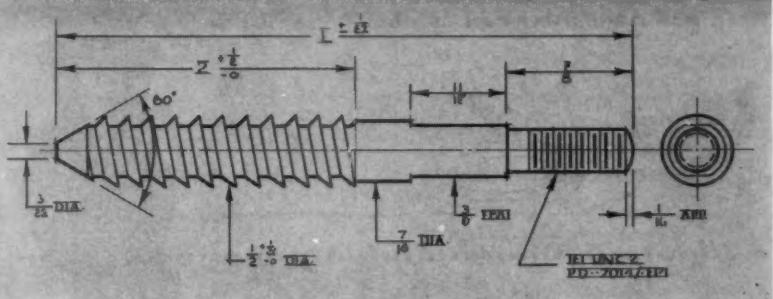
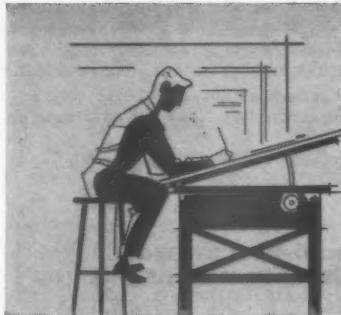
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NUT ASSEMBLY ELIMINATES BACKLASH IN SCREW DRIVE

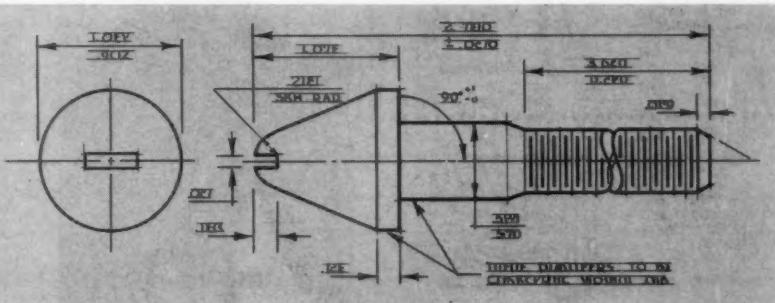
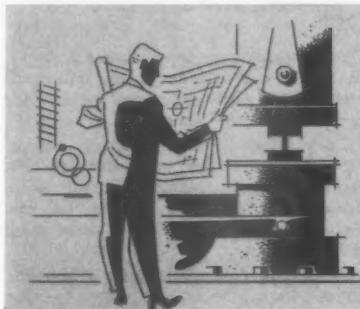


An anti-backlash nut assembly is a small, easily installed device that deals with the problem of backlash in a screw drive.

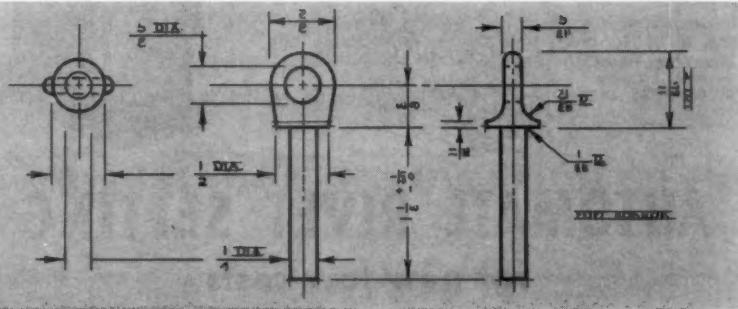
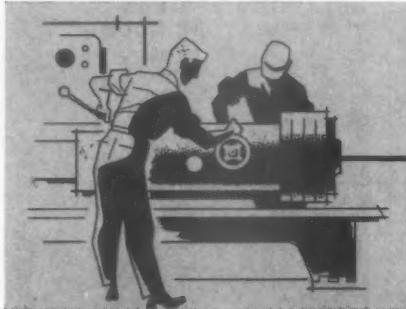
The assembly consists of a body and insert fabricated of low friction bronze and selected springs. The body and insert are loaded against the mating screw by the springs. Six sets of springs are available for each body



from design...



to engineering...



through production... Rely on Republic for

FASTENERS and FORMED PARTS "SPECIALS"

When standard fasteners or formed parts can't handle the job, count on Republic's Special Products Team. Tough design and production problems are their specialty. Your job is tackled with problem-solving know-how and experience.

CAN HANDLE COMPLETE JOB—OR A SINGLE PHASE. Republic will do the job the way that's best for you. (1) Completely design, engineer, and produce your "special"; (2) Make it from your blueprints, to your specifications; (3) or, produce blanks that are ready for your finish machining or special purpose cutting.

WIDE CAPABILITIES—MODERN METHODS AND EQUIPMENT. Republic produces "specials" in an infinite variety of shapes and sizes. Cold forming, hot forming, extruding, upsetting, (and combinations of these) methods are used. Complete machining, heat treating, and surface finishing facilities are also available. Result—single-source operation that cuts your costs—assures a top-notch job.

For complete information on Republic Fastener and Formed Parts "Specials" write Dept. AS-9344, Republic Steel Corporation, 1441 Republic Building, Cleveland 1, Ohio.

REPUBLIC STEEL

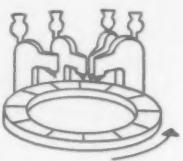


World's Widest Range of Standard Steels and Steel Products

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A FEW OF MANY POSSIBLE RIVETING HEAD POSITIONS THAT CAN BE USED

Rotating fixture showing suggested arrangement of riveting heads.



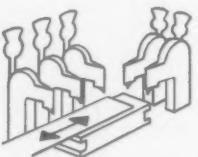
Riveting heads can be positioned for fastening on flat or curved assemblies.



Conveyor Belt permits multiple setting on both sides of an assembly.



Sliding fixture used for riveting 2 sides of an assembly.



AUTOMATE RIVET SETTING for new low costs

For years assemblies made of metal and non-metal or a combination of both have been fastened most economically with semi-tubular rivets. And now even lower costs are possible with the thin-nose riveting heads designed by Chicago Rivet. These heads, pneumatically operated but electronically controlled, can be grouped in clusters on one or more planes and will set rivets as close as $1\frac{1}{16}$ " apart. Automation, thru rotating sliding or continuous belt feeding and riveting stations, is possible. Riveting heads may be repositioned and used again on new assemblies.

CUSHIONED RIVETING REDUCES BREAKAGE

A pneumatic riveter upsets the rivet with a squeezing action which minimizes breakage and automatically compensates for slight variation in assembly thicknesses.

The suggestions of Chicago Rivet fastening specialists will prove most helpful. Call them—no obligation.



AIR-POWERED RIVETING CATALOG
contains description and specifications of 8 single and multiple riveters—also rivet setters designed for automation.

RIVET CATALOG describes 1388 standard tubular and split rivets and 25 single and multiple motorized automatic rivet setters.

Chicago Rivet & MACHINE CO.

946 So. 25th Ave., Bellwood, Ill. (Chicago Suburb) • Branch Factory: Tyrone, Pa.

Use postpaid card. Circle No. 255

and each set can be adjusted at assembly. This permits a wide selection of pre-load, keeping required torque at a minimum for impressed thrust load.

Standard body sizes cover applications from No. 10 to 5/82 diameter screws.

United Control Systems, Inc., 918 Woodley Rd., Dayton 3, Ohio.

Use postpaid card. Circle No. 51

BLIND HOLLOW WALL FASTENER AVOIDS GALLING



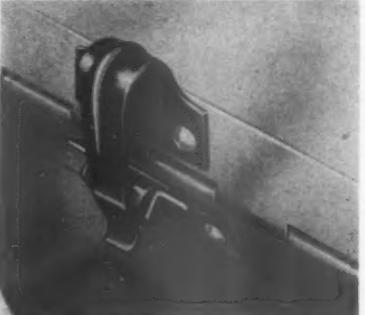
A blind fastener for securing fixtures to wallboard, plasterboard, lath and plaster, tile plywood, sheet metal, etc. is made in nine sizes.

Dazy Hollow Wall Anchor has a rib design on the underside of the screw head to eliminate galling in installation. The fixture can be removed and replaced without disturbing the anchor.

Arro Expansion Belt Co., Marion, Ohio.

Use postpaid card. Circle No. 52

RETAINING SPRINGS FOR MINIATURE DOORS



Using the hinge as a fastener, a tiny retaining spring provides easy access to small doors. Installed on the inside of equipment, the spring is completely invisible from the outside. Very little inside space is required for clearance. When the door is shut, the spring keeps it shut, eliminating rattling or flapping. When door is open, positive spring tension keeps it open, leaving both hands free for work or adjustment. There is nothing to fasten or unfasten.

The No. 50 Door Retaining Spring consists of a tiny steel spring and cam device that holds a door firmly in both open and closed positions. Made especially for the miniature market, it has a maximum moment of $\frac{1}{4}$ in.-lbs.

Installation requires no special tools. The location of spring and cam is interchangeable. All parts are ruggedly constructed for long wear. Each assembly weighs only .014 lbs.

Southco Div., South Chester Corp., Industrial Highway, Lester, Pa.

Use postpaid card. Circle No. 53

assembly and fastener engineering

NOVEMBER, 1960

(Not valid after January 30, 1961)

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mail this card!*

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me on all items I have encircled.

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 Company
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EDITORIAL ITEMS

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assembly and fastener engineering

NOVEMBER, 1960

(Not valid after January 30, 1961)

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EDITORIAL ITEMS

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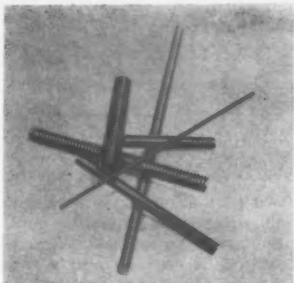
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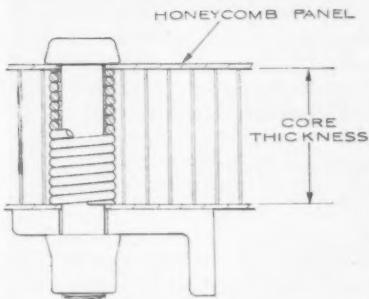
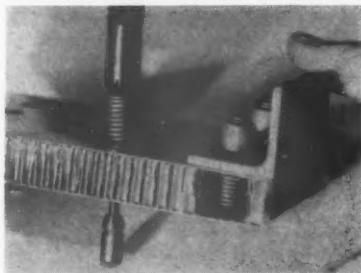
CONTINUOUS-THREADED STUDS IN LENGTHS TO 12 FEET



Continuous-threaded studs are available from stock in standard sizes in lengths up to 12 feet. Special sizes, lengths and materials can be furnished. The Highland Machine Co., 3215 Superior Ave., Cleveland 14, Ohio.

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SPIRAL SPACER USED IN JOINING PARTS TO PANELS



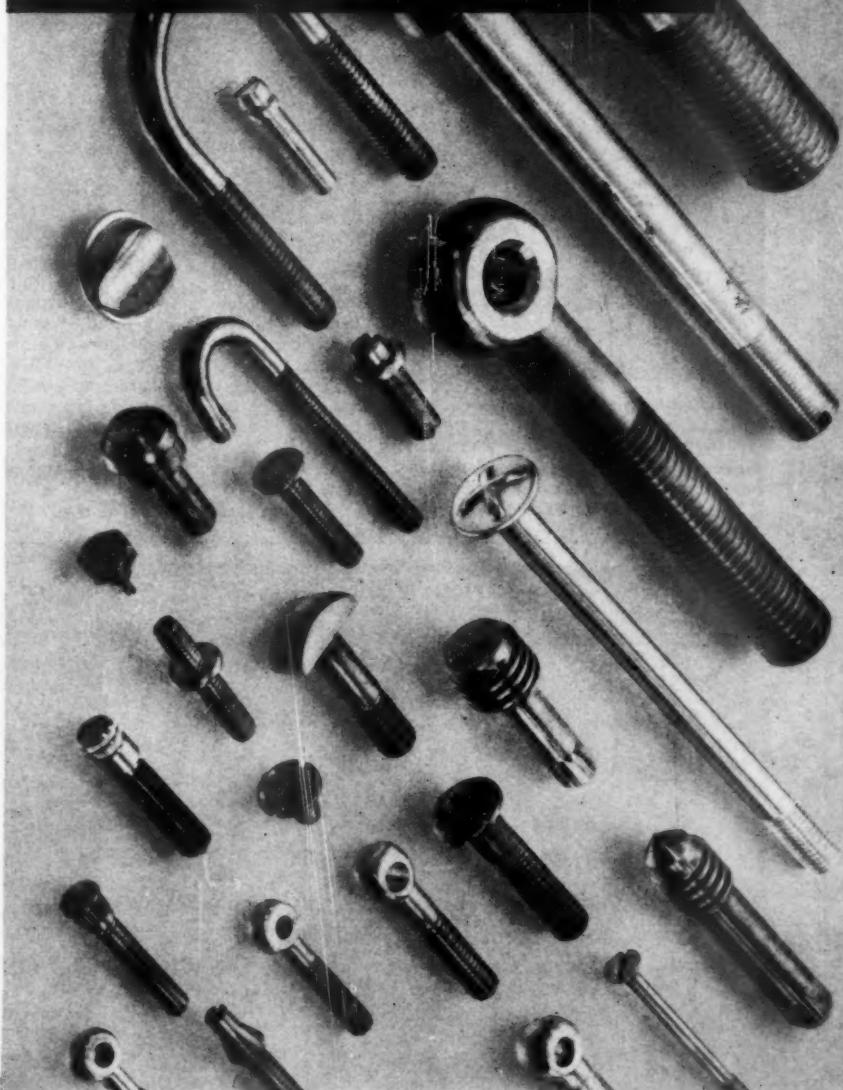
A new line of spiral spacers are for use when parts or materials are to be assembled or joined with fasteners to honeycomb panels and other hollow or core-type structures.

The SSP is a universal type which is installed with hand tools. It is available in lengths for use with $3/16$, $1/4$, $5/16$ and $3/8$ " diameter rivets, bolts or Huckbolt fasteners.

The spiral design and installation method permit use of the same hole diameter as the fastener. The SSP gives added flexibility of application to standard panel designs: It eliminates the need for specially designed pre-planned panels having integral spacers and it simplifies panel rework resulting from design changes. Since it is specifically designed for use where parts are to be joined with fasteners to cored panels, the SSP provides

HARPER PARTS LIKE THESE

...AT BIG SAVINGS!



PARTS PRODUCED BY HARPER *FLO-FORM*

are cold formed or hot forged from bar and wire stock with practically no waste of metal. In a completely integrated plant, Harper's controlled processes—from billet to bolt—assure quality and uniformity resulting in a better part at important savings. With an inventory of over 150,000,000 pieces in more than 100 alloys—including many specials illustrated above—Harper can fill your order today. Consult the Yellow Pages for the name of your nearest Harper Distributor.



Write today on your letterhead
for FREE copy of Harper's
FLO-FORM Brochure

THE H. M. HARPER COMPANY
8214 Lehigh Ave. • Morton Grove, Ill.
Use postpaid card. Circle No. 256



HARPER

optimum columnar support for panel face sheets and maximum joint strength. The high column strength also avoids crushed or inadvertently dimpled panels.

Typical structures and materials for which SSP spacer-fastener combination is recommended are: honeycomb panels; metal-faced panels having cores of balsa, styrofoam or other crushable materials; square tubing; hollow partitions; thinwall channels; and corrugated sheets.

Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

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CONDUCTIVE GASKETING FOR HIGH TEMPERATURE USE



Conductive gasketing of silicone rubber and metal have been developed for high temperature use. Cohrlastic gasketing conforms to irregular surfaces and is impervious to fluids.

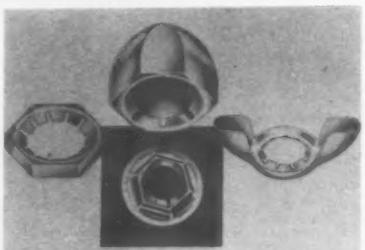
The gasketing comes in two types,

No. 8516 and No. 8520, which are 30 and 24 mesh aluminum alloy wire cloth impregnated with 50 durometer silicone rubber to a thickness of .016" and .020". Material will withstand temperatures from -65 to 500°F.

The Connecticut Hard Rubber Co., 407 East St., New Haven 9, Conn.

Use postpaid card. Circle No. 56

FOUR LINES OF STAMPED NUTS



Four complete, new lines of stamped fasteners include one-piece washer nuts, acorn nuts, regular nuts and wing nuts.

The nuts are available in heat treated spring steel in all popular sizes and finishes. Samples. Custom fasteners are available.

Crest Products, Inc., Box 64, Union, New Jersey.

Use postpaid card. Circle No. 57

TUBE PACKAGING EASES 2-PART ADHESIVE HANDLING



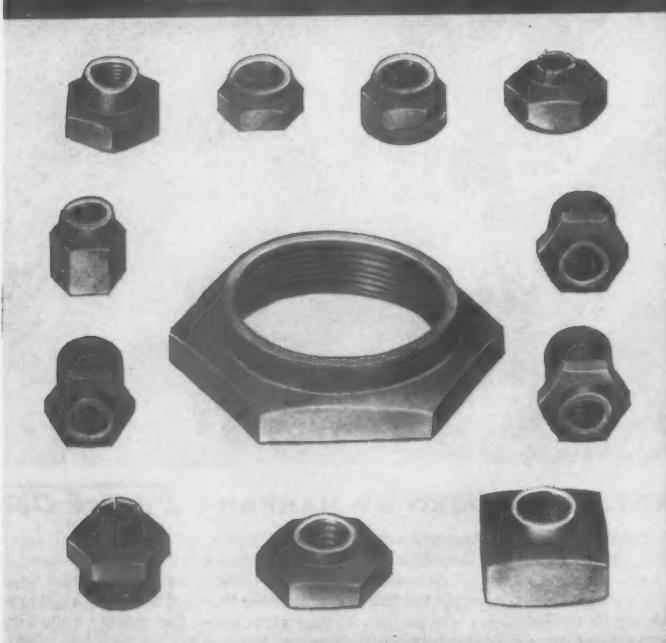
A two-part adhesive is packaged in a small saran tube. The tube contains both the base material and the catalyst. The catalyst is contained in a smaller tube inside the larger tube. To mix, the small tube is broken by squeezing, the catalyst pops out of the smaller tube and is kneaded into the base. After the base and catalyst are mixed by repeated squeezing of the plastic tube, the end is snipped off and the tube serves as the applicator.

The product was developed originally for bonding replacement mirrors to automobile windshields, but it is expected to have a wide application wherever a strong, flexible chemical setting type adhesive is needed. The package provides a clean, economical way of handling the adhesive.

Armstrong J1158 gives a resilient bond at -40° F. to 185° F. It has good tenacity and flexibility in holding materials such as metal to glass, metal to

SPECIAL LOCKNUTS . . .

that solved fastening problems



As the largest specialized nut manufacturer in the world we are constantly developing new methods and products for this phase of assembly in industry . . . in the field of locknuts we have made spectacular progress. Besides standardized hexagon "Conelok," "Huglock" and "Marsden," sizes #10-3" of ferrous and non-ferrous materials, we provide many special application nuts, upon a basis of these designs . . . a few of which are here shown . . . Our sales and engineering departments are available to help you solve your fastening problems . . . Send for 12-page condensus catalog, it includes complete specifications of our entire product, as well as engineering data. We also have an one hundred and forty four page catalog where more comprehensive information is required.

Manufacturers of Standard and Special ferrous and non-ferrous Hexagon, Square and "12 Pointer" nuts . . . "Conelok," "Huglock" and "Marsden" locknuts.



NATIONAL MACHINE PRODUCTS COMPANY
an SPS company 44250 UTICA ROAD UTICA, MICHIGAN

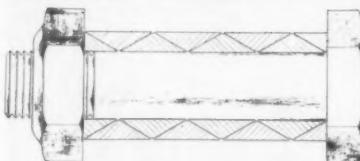
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metal, plastic to glass, rubber to metal, rubber to glass, aluminum to aluminum, aluminum to glass, etc.

Armstrong Cork Co., West Liberty St., Lancaster, Pa.

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ADJUSTABLE DIA. BOLTS FOR EXACT RADIAL FITS



A simple, economical means of obtaining exacting radial fits in all holes is possible with Adjusto-Fit adjustable diameter bolts.

Any degree of tightness—plus the ability to compensate for wear—is made possible by this new development which makes reaming of holes, taper pins and expensive close tolerance machining obsolete.

The bolts also provide installation and removal simplicity. No pressing or careful matching of bolts to holes is required since adjustable wall-thickness bushings are incorporated permitting bolts to easily slide into the bore of the hole and be simply tightened to exacting degrees of clearance or tightness by even unskilled help. Sample.

Adjustable Bushing Co., 12036 Vose St., North Hollywood, Calif.

Use postpaid card. Circle No. 59

ADD LID, PUSH-PULL KNOBS TO STOCK MOLDINGS



Two types of molded push-pull and lid knobs combine a smart angular contour and crowned top surface with functional design for a variety of pushing and lifting applications. Difference between the types is that No. 237 is molded in $\frac{3}{4}$ scale, so the two may be matched whenever two sizes are required.

Although stock tooling is used to produce these parts, they may be tailored for individual customers. The rounded top surface permits molding of a trademark, and many phenolic and urea colors can be substituted for the standard black phenolic. Such special characteristics as extra strength, low friction, and chemical and high-

PLANETARY THREAD ROLLING MACHINE CUTS COSTS Rolls External Threads on HOLLOW WORK

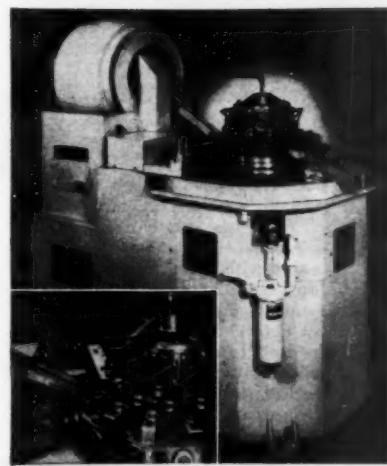
Class 3 Fit

9,000 TO 20,000 PIECES PER HOUR



IF YOU ARE NOW BUYING tube nuts like these, you can cut costs by heading them yourself and roll-threading the hollow parts on a Prutton Model 300. You can buy cheaper stock (rolled wire) and make your own parts.

IF YOU ARE NOW MAKING THESE PARTS ON A SCREW MACHINE, you can get "cold forged" quality faster for less than the cost of cutting or grinding. No need to buy expensive hex-stock. And, you eliminate these screw machine operations: drilling, turning, chamfering, threading and cut-off.



PRUTTON'S PLANETARY CIRCULAR DIE accounts for the tremendous increased production. Hollow parts are hopper fed in a continuous stream to the circular die. The "lost motion" of the reciprocal type thread roller is completely eliminated.

The Prutton Model 300 is the only **high speed machine** on the market for external roll-threading of hollow work. It can roll-thread as many as 18,000 pieces per hour with a slow die speed of only 164 fpm—which means long die life.

Speeds output many times—cuts costs 50%—improves quality—saves man hours and floor space. Used by some of the biggest names in American industry.

VERSATILE: Built primarily for hollow work . . . but may also be used on solid work in a wide range of metals and sizes.

HIGHER OUTPUT AND LOWER COSTS ADD DOLLARS TO YOUR THREAD ROLLING PROFITS . . .

A Prutton can be used for thread rolling, roll forming, knurling, marking, serrating and necking of threaded hollow work, special parts, nails, bolts and screws in a wide range of sizes. Send prints and/or samples for free estimates on machine costs.

Write or Phone for Cost Savings Information, TODAY!

Prutton

CORPORATION
3295 WEST 130th STREET
CLEVELAND 30, OHIO

Leader in Planetary
Thread Rolling

JUST PIN THIS COUPON TO YOUR LETTERHEAD

PRUTTON CORPORATION
3295 West 130th St.
Cleveland 30, Ohio
Dept. AF

Please send information on Model 300 Thread Rolling Machine

Name _____ Title _____

Company _____

Street Address _____

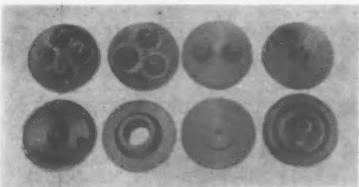
City _____ Zone _____ State _____

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heat resistance may also be obtained.
Dimco-Gray Co., 207 E. Sixth St.,
Dayton 2, Ohio.

Use postpaid card. Circle No. 60

Sponge Grommet Seals Around Wires, Tubes



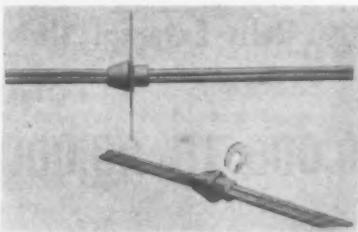
Making its first appearance in current automotive production is a new sealing grommet. The hook-in cellular sponge plastisol can be molded to suit any required situation, in any size, shape or dimension and can be produced as a production item.

Arco design with spring steel retaining tabs insures positive seal between grommet membrane and sheet metal. It will not deteriorate in heat or cold and lends itself to any specified shape for safe and positive insulation around wires, conduit tubes, pipe, loom or cable. The grommet is available in various elastomeric insulating materials.

Automotive Rubber Co., 12550 Beech Rd., Detroit 39, Mich.

Use postpaid card. Circle No. 61

Strain, Relief for Electronics Assembly



A strain relief for the electrical and electronic industries is molded with a groove about its diameter to accommodate the panel through which it is inserted. A separate metal C-ring is provided to lock the strain relief in place.

The C-ring permits more accurate positioning and provides easier installation than is possible with the usual snap-in type. In addition, the metal clamp assures more than adequate support for U.L. strain relief pull-test requirements. The SR-1082 can be utilized for both round and D shaped panel openings. When used with D shaped openings, the strain relief prevents the cord from being twisted.

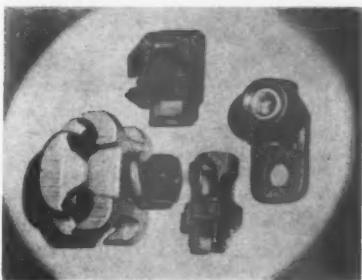
The SR-1082 can be employed with wire sizes No. 18/2 SVT, No. 18/2 SPT-2, No. 18/2 SPT-1, 20 XT, TPT, 20 PLT and other special constructions. It is a molded construction and can

be color-matched to any cord color used.

Phalo Plastics Corporation, Shrewsbury, Massachusetts.

Use postpaid card. Circle No. 62

COMPLETE LINE OF ELECTRICAL CONNECTORS



A line of electrical fittings and accessories includes connectors for both copper and aluminum wire.

Types offered are split bolt, vise grip, service entrance, various clamps, parallel connectors, aluminum compression sleeves, solderless terminal lugs, ground clamps and straps.

Bronco-grip connectors are machined or cast to exhibit minimum relaxation and retain maximum clamping force. High torque strength and corrosion resistance are also reported for the parts.

Western Insulated Wire Co., 2425 E. 30th St., Los Angeles 58, Calif.

Use postpaid card. Circle No. 63

INSERT CHASER
H&G
DIE HEAD

STYLE DM
FOR BROWN & SHARPE
AUTOMATICS

STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

On Brown and Sharpe, and other automatics

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For approximately \$50 you get a dozen sets of X-16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime.

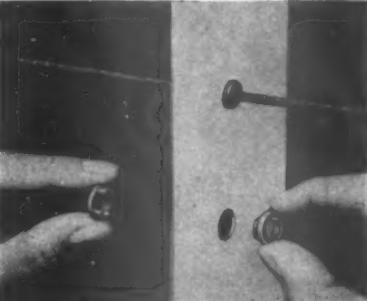
FREE: "UNIFIED AND AMERICAN SCREW THREAD DIGEST."

THE EASTERN MACHINE SCREW CORPORATION, 2548 Barclay St., New Haven, Conn.

Use postpaid card. Circle No. 289

82

LOCKING PLASTIC GROMMET FOR WIRE, TUBING, CABLE



Wire, cable or tubing can be insulated and supported from a mounting panel, chassis, wall, housing or similar surface with a plastic grommet.

The grommet is inserted in panel hole and snapped together. It locks in place and provides a rigid bearing surface, high dielectric, extreme chemical and wear resistance. Identical halves form a complete grommet, thus eliminating separate handling. Any color, any plastic material can be used for color coding or special applications.

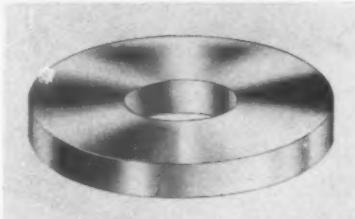
Three sizes are available: No. 3 with 3/16" hole diam.; No. 4, 1/4"; and No. 6, 5/16". Panel hole required is 1/4" larger than wire hole diameter. Molds for special sizes can be made upon application.

Budwig Mfg. Co., Box 4212, Glendale 2, California.

Use postpaid card. Circle No. 64

Assembly and Fastener Engineering

FLAT NYLON WASHER FOR SPACER, INSULATOR



A flat nylon washer is designed for use as a spacer or as an insulator and can be used on any screw, bolt, pin, nail or rivet. Because of the low coefficient of friction of nylon against metals, the washer provides an inexpensive bearing that requires no lubrication. The washers can also be used to prevent corrosion, since the nylon insulates dissimilar metals. The natural resilience of nylon enables the washer to absorb shock and vibration.

The flat nylon washers are excellent for use in making fastenings to highly finished porcelain or ceramic materials because the washer cushions the pressure of the fastener and permits it to seat to the required tightness without the danger of cracking, chipping, or crazing of the surface.

Made of DuPont nylon which meets specification MIL-P-17091-B, the washer has a tensile strength of 15,000 psi.

Nyltite Corporation of America, 280 Badger Ave., Newark 8, N.J.

Use postpaid card. Circle No. 65

DIODE CLIPS INCREASE CIRCUIT RELIABILITY

Simpler component installation and replacement of diodes or rectifiers can be achieved through the use of phosphor bronze mounting clips.

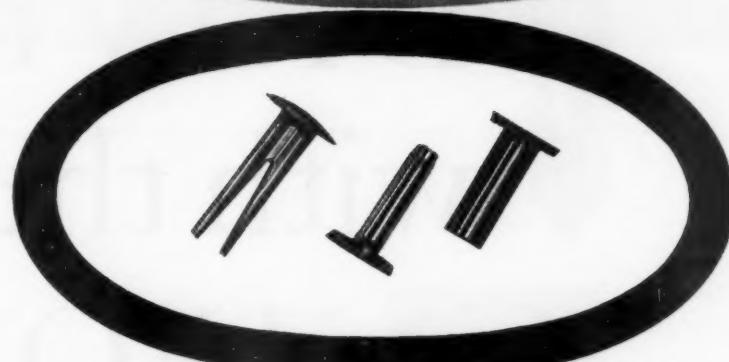
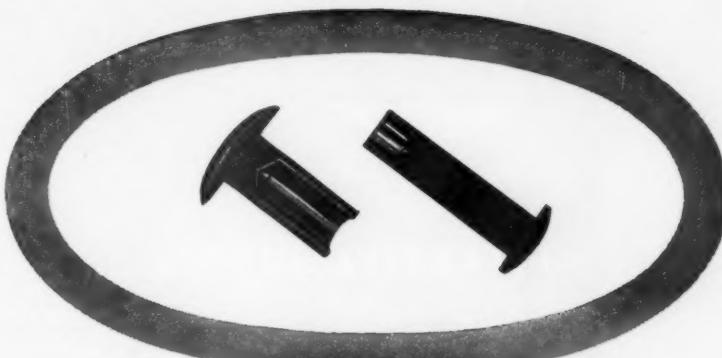
Circuit contact is provided by an integral lug passing through the mounting surface either for connection to printed circuit leads, or for solder connection. Each clip pair exerts a strong retaining spring action on the body of the component, pressing the shell downward against a small projection in the clip which penetrates through films or oxides to clean metal, assuring circuit continuity under extreme conditions of stress.

The Wyre clip of the pair holds the standard soldering lead of the diode or rectifier with an edge grip in a specially contoured slot. This securely holds the lead and allows easy replacement or removal by a twisting motion, without unsoldering leads or disturbing other parts of the circuit.

The clip, accommodating diodes or rectifier cases from a .245" to .270" O.D., may be secured to the mounting surface by eyelets or rivets. These clips are available separately in bulk, or mounted as illustrated. They are also available for surface wiring connections.

Atlee Corp., 41 Prospect St., Woburn, Massachusetts.

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COST PREVENTION...NOT COST REDUCTION...IS THE EFFICIENT WAY TO LOW-COST ASSEMBLY



The "in-place" cost of a fastener is what really counts to cost-conscious production men. By deciding on inexpensive Milford tubular rivets as a fastening method and installing them with Milford automatic rivet-setting machines, design and production engineers are eliminating costs at the initial production stage rather than trying to reduce costs later at the assembly line.

You can find out more about Milford's cost-cutting ideas by asking your Milford Representative to show you Milford's new *MANUAL OF MODERN RIVETING PRACTICE*. It's crammed with valuable cost-cutting tips and technical data that can be quickly translated into dollars on your production line.



Use postpaid card. Circle No. 260



DRIVERS with the UNIFORM QUALITY

of Phillips Screws



Manufacturers of Phillips Drivers are striving to make certain that quality and performance specifications for their product consistently meet the high standards required for Phillips Screws. Concentrated effort will be made to keep driver and recessed head "precision-matched."

To accomplish this objective, the makers of Phillips Drivers, an integral part of the Phillips Research Engineering Standards Committee, have established quality control methods governing every phase of the production of all Phillips Drivers.

This teamwork by engineers and manufacturers of Phillips products is just part of a well-integrated program to supply industry with a uniformly high quality product — Phillips Screw, "The fastener with a plus."

SCREW RESEARCH ASSOCIATION

161 PRESCOTT STREET, BOSTON, MASS.

Use postpaid card. Circle No. 261

Assembly and Fastener Engineering



USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 78.

SPECIFYING HINGES

How to specify standard and special hinges is discussed through text and diagrams in 56-page Catalog 153. The indexed reference guide also catalogs aircraft, box, cabinet, display case and other types of hinges and hardware. Braun Mfg. Co., Inc., 1657 N. Kostner Ave., Chicago 39, Ill.

Use postpaid card. Circle No. 70

STANDARD FASTENERS

"Fall Fashions for Fasteners" describes a general line of standard fasteners using a consumer approach in art and copy. The 12-page booklet pictures and specifies hex bolts, cap screws, lag screws, carriage bolts, studs and hex nuts, machine screws and bolts, plow and elevator bolts. Bolt and Nut Div., Republic Steel Co., 1970 Carter Rd., Cleveland 13, Ohio.

Use postpaid card. Circle No. 71

WELDING TABLES

Tables to simplify calculation of the electrical power supply required by resistance welders are contained in eight-page Brochure SP-8A. The minimum safe rate of operation of welder can be determined by the tables, which establish the maximum electrical duty cycle of a transformer under various demand loads. The Taylor-Winfield Corp., Warren, Ohio.

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SELF-LOCKING COTTER

Three-step locking action of a cotter pin is pictured and described on a one-page mailing piece. Rein Leitzke, Hustisford, Wis.

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RETAINING CLIP

Clinch-it spring fasteners are designed to retain diecast and cold forged ornaments and studs. The clip is plier-installed to bite into the stud with a

vibration resistant grip. Robin Products Co., 27027 Grosebeck Hwy., Warren, Mich.

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CORROSION COMPUTER

How each of eight types of metal withstands the corrosive effects of 141 chemical agents is told at a glance on a 4" x 8" slide-rule type computer. Color-coded comments tell how the metal will react to the agent. The H. M. Harper Co., 8200 Lehigh Ave., Morton Grove, Ill.

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CONVEYOR FOR SMALL PARTS

Portable conveyors for moving small parts are explained and illustrated in eight-page Bulletin RS-701. Five types of cleated belt conveyors for general, light and heavy duty applications are pictured with typical products handled. Two magnetic conveyors are available. The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich.

Use postpaid card. Circle No. 76

NYLON SNAP BUSHINGS

Finger pressure assembly is all that is required to snap bushings into $\frac{7}{16}$ " diameter holes. A price list and dimensional drawing of the bushing is given in a two-page illustrated leaflet. Samples. Heyman Mfg. Co., 1000 Michigan Ave., Kenilworth, N.J.

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AIR ASSEMBLY TOOLS

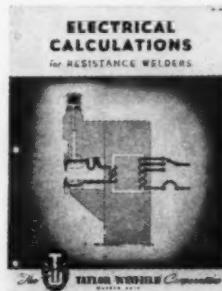
A 16-page booklet, "Dividend Dollars For You", points out the increased man-hour output possible with new model assembly tools: screw drivers, drills, impact wrenches. Each tool—old and new model—is compared by output and a dollar estimate made, based upon the average salary of the operator and his increased productiveness.



(See 70)



(See 71)



(See 72)

Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y.

Use postpaid card. Circle No. 78

TORQUE MANUAL (REVISED)

The 31-page revised 3rd edition of a popular Torque Manual contains 116 illustrations and 7 tables. Discussion of applications, formulas for using torque wrench adapters, care of torque wrenches and adjustments and other material covers completely the subject of torque wrenches. P. A Sturtevant Co., Addison, Ill.

Use postpaid card. Circle No. 79



ASSEMBLY MACHINES

Five basic machines for a broad range of assembly operations are pictured and specified in a six-page brochure. A new double end taper is given special presentation and two cost-cutting case histories are pictured with the operations detailed. The Bodine Corp., 317 Mountain Grove St., Bridgeport 5, Conn.

Use postpaid card. Circle No. 80

NYLON SEALING WASHERS

Rolled and flat nylon washers and a headed insulating sleeve are covered in a four-page design data sheet. Designed to provide sealing action with bolts, screws, nails or rivets, the parts are pictured and described in use with each of the above named fasteners. Samples. Nyltite Corp. of America, 280 Badger Ave., Newark 8, N.J.

Use postpaid card. Circle No. 81

ASSEMBLY PRESS

Automatic hydraulic C-presses through 15 tons capacity are equipped with interlocked index tables for assembly operations, riveting and staking. Features of the press line are described with dimensional drawings, specifications and photos. Three index table models with from six to 12 stations are introduced. The Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

Use postpaid card. Circle No. 82

SOLDERLESS TERMINALS

Technological and company history unfold together in an 18-page booklet "From Kite and Key to Outer Space." Company history from basic applications of solderless termination techniques to advanced electronic components are shown through text and captioned photos of products and facilities. AMP Inc., Eisenhower Blvd., Harrisburg, Pa.

Use postpaid card. Circle No. 83

ELECTRONIC WELDING

The first issue of a new eight-page house organ, "Electronic Welding", provides information on assembly of electronic packaging, fine wire leads, thin and hard foils and screens and miniature circuit modules. Weldmatic Div., Unitek Corp., 950 Royal Oaks Dr., Monrovia, Calif.

Use postpaid card. Circle No. 84

TERMINALS, CONNECTORS

Standard terminals and connectors are specified in 28-page Catalog 60. In addition to full-page illustrations of each attaching machine, reference charts list wire sizes and stud and hole sizes. Each terminal is illustrated and drawn dimensionally. Electric Terminal Corp., Box 2217, Providence 5, R.I.

Use postpaid card. Circle No. 85

MINIATURE SOLDERING IRON

Fifteen features of a miniature soldering iron are listed in a one-page flyer. An actual-size drawing of the one ounce iron also pictures several detachable tips from 3/32" to 3/16" in diameter. The handle is of yellow plastic. M. M. Newman Corp., 79 Clifton Ave., Marblehead, Mass.

Use postpaid card. Circle No. 86

SELF-STUDY SILVER BRAZING

An eight-page brochure describes at-home or in-plant training in silver brazing. The self-study course is based on a monthly three-day brazing course which trained over 50,000 industrial brazers. The brochure lists the contents of the course and illustrates new examples of where silver brazing is being used. Handy & Harman, 82 Fulton St., New York 38, N.Y.

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ASSEMBLY FIXTURES

Ball and socket work positioners, which leave assemblers with both hands free, are detailed in 58-page Catalog 115. Eight types of Powrarm fixtures are pictured and specified, with a new build-it-yourself fixture introduced for assembly line flexibility. Various other sections of the ring-punched manual cover vises, c-clamps, power tools. Wilton Tool Mfg. Co., 9525 W. Irving Park Blvd., Schiller Park, Ill.

Use postpaid card. Circle No. 88

SEALING GROMMET

A cellular sponge grommet for sealing between metal components is pictured in use and described in a one-page flyer. The face of the hook-in Plastisol grommet can be molded to

required size, shape or diameter. Automotive Rubber Co., Inc., 12550 Beech Rd., Detroit 39, Mich.

Use postpaid card. Circle No. 89

STAKED INSERTS

Five types of press-in fasteners providing load-bearing threads for metals or plastics too thin or soft to thread are specified in a 16-page brochure. A chart shows typical torque values obtainable with the inserts and installation data is furnished. A new stud is also introduced. My-T-Grip Mfg. Co., Inc., 176 Broadway, New York 38, N.Y.

Use postpaid card. Circle No. 90

SHAFT SEALS

Seals for the rotating shafts of industrial equipment are introduced in a four-page brochure. Specs and illustrations accompany a chart giving a complete seal size range. Installation pictures show the various models in use. Syntron Co., 820 Lexington Ave., Homer City, Pennsylvania.

Use postpaid card. Circle No. 91



INDEXING CHASSIS

From 6 to 32 work stations are available on series H turret indexing chassis for automatic assembly machines. An eight-page file folder discusses both the series H and K lines, includes dimensional drawings and photos. Units contain motor, drive and clutch. Swanson-Erie Corp., 814 E. 8th St., Erie, Pennsylvania.

Use postpaid card. Circle No. 92

ELECTRICAL CONNECTORS

New design features of single-conductor plugs and receptacles are introduced in four-color, 12-page Bulletin PR259-1. Simplified assembly, brass and nylon plastic parts, "fishtail" plug design are some of the new features described for socket and pin type electrical connectors from 25 to 250 amperes. The Superior Electric Co., 83 Laurel St., Bristol, Conn.

Use postpaid card. Circle No. 93

BACK-UP RINGS

Designers will be interested in 12-page punched ring Catalog 5482 on back-up rings (which extend the operating range of o-rings). Characteristics of back-up rings, how to use them and specify them, as well as the merits of contoured and continuous rings are told through text, diagrams and specifications. Parker Seal Co., 10567 Jefferson Blvd., Culver City, Calif.

Use postpaid card. Circle No. 94

POWER NUT SETTERS

File folder sheet superseding previous issues contain data on portable air vertical nut setters, reversible and non-reversible nut setters, angle nut setters and angle drills. Most models are available with preset torque controls. Pictured and specified. Gardner-Denver Co., Quincy, Ill.

Use postpaid card. Circle No. 95

CUSTOM MACHINING

Facilities for machining special parts are introduced in an eight-page brochure. A useful chart presents seven methods of saving money when specifying screw machine parts. Machines and capacities are listed and typical work illustrated. Waltham Screw Co., Waltham, Mass.

Use postpaid card. Circle No. 96

THREAD LUBRICANT

The theory and practice of lubrication by solids is the subject of a 24-page booklet. Answering the question "What is Molykote?", the booklet discusses molybdenum disulfide lubricants and forms in which it is available. The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

Use postpaid card. Circle No. 97

RESISTANCE WELDERS

A new 12 page brochure, in color, BT-60, illustrates and describes a line of resistance welders, in all phases, spot, projection, seam, roll seam, portable welders, aircraft spot and seam, flash, multi-spot and automated machines. The Federal Machine and Welder Co., Warren, Ohio.

Use postpaid card. Circle No. 98

PROBLEM-SOLVING SCREWS

Special screws engineered to cut assembly costs by solving problem applications or doing multiple fastening jobs are described in six-page Bulletin 100. How and when to use Sems, Keps, various self-tapping screws, and other fasteners to seal spanning oversized holes, fasten nylon components and handle similar bottlenecks is discussed. Shakeproof Div., St. Charles Rd., Elgin, Illinois.

Use postpaid card. Circle No. 99



WIRE FORM DESIGN MANUAL

A wire component and assembly manual features case histories of how design engineers were able to cut costs and improve the quality and sales appeal of their products through the use of wire and strip metal components. The newly revised manual also describes the principal types of wire

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available for component construction, the most popular finishes, wire sizes and the variety of end treatments, threading and forming treatments possible. E. H. Titchener & Co., 57 Clinton St., Binghamton, N.Y.

Use postpaid card. Circle No. 100

LOCKS, CATCHES

Drawbolts, locks, catches and other devices are pictured actual size in a two-page ring-punched sheet. Applications are suggested. Excelsior Hardware Co., Woodland & Mix Sts., Stamford, Connecticut.

Use postpaid card. Circle No. 101

RETAINING RING PLIERS

Pliers for applying and removing retaining rings are specified and priced in a four-page bulletin. External and internal ring pliers are available with adjustable stop and spring or in economy model types. Industrial Retaining Ring Co., 57 Cordier St., Irvington 11, New Jersey.

Use postpaid card. Circle No. 102

WELD PINS

Using weld pins to solve problems where permanent, strong, unthreaded fasteners are required is the theme of six-page Bulletin 603. Five types of weld pins, typical applications and specifications for each are presented. Typical weld set-ups are recommended.

Samples. The Ohio Nut and Bolt Co., 33 First Ave., Berea, Ohio.

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900°F BOLTS, NUTS

A new family of bolts and companion locknuts for 900°F applications are covered in two bulletins No. 926. Together the fasteners comprise a threaded joint of 200,000 psi tensile strength at 900°F. Specs, strength characteristics, torquing properties are charted and described. Standard Pressed Steel Co., Jenkintown, Pennsylvania.

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TOGGLE CLAMPS

Engineering data on a line of standard and special drop forged toggle clamps are included in four-page Bulletin C-360. Clamps are specified and pictured in typical applications. Wolverine Tool Co., 1480 E. Woodbridge St., Detroit 7, Michigan.

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STAINLESS, NYLON PARTS

Standard or special fasteners in nylon and stainless steel are offered through a four-page brochure. Samples of special fasteners and available manufacturing facilities are pictured. Line drawings of screws, nuts, pins, bolts, washers and studs are accompanied by specifications of standard parts. Anti-Corrosive Metal Products Co., Inc., P.O. Box 1894C, Albany 1, N.Y.

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HOLE PREPARATION

Automatic machines and systems for secondary operations are explained in a 12-page brochure. A helpful chart pictures 12 typical parts and suggestions, tooling needed to drill, tap or thread the part. How a basic unit built on a modular principle can be adapted to many operations is detailed. Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Ill.

Use postpaid card. Circle No. 107

ASSEMBLY PRESS

Cost reduction through more efficient assembly is the theme of the special Machine Tool Exposition issue of "Hydraulic Review." The 16-page house organ introduces several new Multi-presses through pictures and text. Denison Engineering Div., American Brake Shoe Co., 1160 Dublin Rd., Columbus 16, Ohio.

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WHY INDUCTION BRAZING?

The question "Why induction brazing and soldering" is posed and answered through review of 11 sample case histories where savings have been made. A 12-page illustrated brochure shows how in a number of industries, assembly can be speeded and costs reduced through automatic machinery. Tocco Div., The Ohio Crankshaft Co., 3800 Harvard Ave., Cleveland 5, Ohio.

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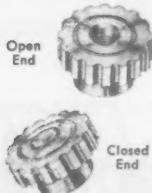
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GRC's exclusive wide grip; generous width tops have deep fluted edges for firm, comfortable grip. Corrosion resistant, rustproof. Smart design for added sales appeal.

Head Diameters: $\frac{1}{2}$ " thru $1\frac{1}{8}$ "
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Producer of
Small Die Castings



GRIES



BALL STUDS

Advantages of using cold-formed ball studs and special parts mass-produced for production savings are described in four-page Bulletin TDL-162. The two-color, illustrated folder demonstrates how cold-forming techniques lower costs and improve metallurgical qualities of parts for precision assemblies.

The folder includes an engineering drawing detailing close tolerances possible. Dunn Steel Products Div., Townsend Company, Plymouth, Mich.

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Do you have a fastener problem? TRIMCLIPS have been widely known and used in the automotive, radio, stove, refrigeration and aircraft industries most extensively for attaching trim panels and moldings to the structure.

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November, 1960

ELECTRONIC WELDING

A series of miniature electronic welders and equipment are pictured, described and specified in a series of two-page flyers printed on heavy stock suitable for file folders. Spot and seam welders have stepless energy control and speeds up to 120 per second. Vacuum Tube Products Div., Hughes Aircraft Co., 2020 Short St., Oceanside, California.

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CONVEYOR BUILDING BLOCKS

Eighteen types of belt, roller and gravity wheel conveyors are pictured and described. Six-page Bulletin CL-858 introduces standardized components which can be used on the "building block" principle to meet specific assembly setup requirements. Conveyor Specialty Co., Inc., 33 Newport Ave., North Quincy 71, Mass.

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THERMOELECTRICITY

A complete bibliography on thermoelectricity includes a critical commentary on each of the listed magazine articles. The listing was prepared over the past several years for use by research engineers. AMP Inc., Harrisburg, Pa.

Use postpaid card. Circle No. 113

ULTRASONIC WELDING

The American Welding Society announces the publication of a new booklet, "Ultrasonic Welding," containing 38 pages and 29 illustrations. The booklet, a reprint of material published in Section III of the *Welding Handbook* (4th Edition), contains sections discussing fundamentals of the process, the metals which can be welded, welding techniques, weld characteristics, quality control, equipment and applications. In addition, a brief bibliography and index are included. \$1.50. American Welding Society, 33 West 39th St., New York 18, N.Y.

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Progressive, efficient and expanding manufacturer of metal and plastic fasteners and allied products requires additional sales help. Company has nationally advertised products for appliance and automotive manufacturers and additional capacity to produce small, general stampings on a competitive basis. Sales personnel or manufacturers representatives are needed in Middle West, Eastern Seaboard and West Coast areas.

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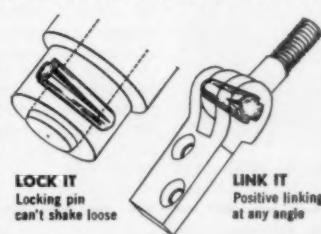


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THE SOLID GROOV-PIN

Every one of the Groov-Pins shown here was designed with your pin problems in mind. Designed to withstand the rigors of constant shock and vibration without loosening...to drive easily into a simple drilled hole...for faster hand or production feeding, including hopper feed...for a permanent connection that stands up to vibration fatigue as only a solid pin can.

Groov-Pins are made to meet your requirements, too. Standard sizes run from $\frac{1}{2}$ to $\frac{1}{2}$ ", specials to fit your needs at standard prices over 5,000 pieces. Send for illustrated catalog, free samples.



No matter what your pin problem,
there's a Groov-Pin to solve it for you.

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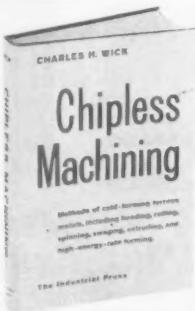
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A new how-to volume on chipless machining . . . shaping metal parts without the production of chips . . .

CHIPLESS MACHINING

By Charles H. Wick

This basic, technical guide describes and illustrates in detail the newer methods of cold forming, gives data on economies resulting from savings in time and materials and evaluates advantages and limitations of various processes and their applications. Covers cold-heading, thread rolling, spline rolling, power spinning, rotary swaging, radial forging, cold forming, cold extrusion and explosive forming. Of special value to top management, design engineers, process planners, tool engineers and production men because emphasis is on practice—not theory.



502 pages, 326 illustrations
\$10.00

The how and why of developing equipment for special operations . . .

AUTOMATING THE MANUFACTURING PROCESS



1958—176 pages—\$4.95

By George F. Hawley

Vice President of Development & Engineering
Automation Engineering Laboratories

This valuable book discusses in practical terms the problems involved in developing automatic machinery for specific operations such as assembly of components, packaging of individual products and a host of other applications. Valuable to both management and production personnel as well as designers and development engineers, it will be of direct, practical help to any company contemplating or planning automation of any manufacturing operation.

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Please send me prepaid the books indicated below:

- copies of "Automating the Manufacturing Process" @ \$4.95.
- copies of "Fasteners Handbook" @ \$12.50.
- copies of "Chipless Machining" @ \$10.00.
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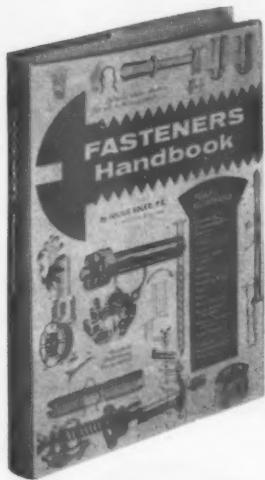
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FASTENERS HANDBOOK

By Julius Soled, P.E.

Here is a book which provides ready, up-to-date answers to fastening problems in all fields. Its pertinent data, hundreds of illustrations, and full page descriptions supply you with detailed information on currently available fasteners and sources of supply. You can use this book to actually select the fastener you want because this comprehensive book includes standard and proprietary fasteners from all manufacturers. It can be used by design engineers, patent attorneys, sales personnel, fastener distributors and jobbers—in fact, anyone who needs solid information on fasteners available for mechanical assembly.



448 pages, over 500 illustrations
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COVERS EVERYTHING in fasteners . . . rivets, inserts, screws, bolts, studs, nuts, washers, retaining rings, pins, nails, metal stitching, quick release fasteners, masonry anchoring devices, hose clamps and many other types . . . together with directory of manufacturers.

THE NEW PRODUCT

By Delmar W. Karger

Professor and Head of Department of Management, Rensselaer Polytechnic Institute, Troy, New York



6" x 9", 244 pages, \$5

This is a guide for successful product development. It provides tangible help to both experienced manufacturers and those who have done little or no product development. Basic concepts of top management planning and organization for product planning and new product development are covered. The book contains chapters on: basic concepts, organizing for product development, finding new product ideas, costing and pricing the new product, patents, research and engineering, sales, advertising and management considerations of new product development.

This is an important book for today's buyers' market, where success depends on how well a company competes, providing an answer for the farsighted manufacturer who wants to know how he too can develop new, successful products; new, profitable markets.

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INDUSTRY MAKES NEWS



A view of the plating facilities at Garrett Corp.



Vice Admiral William F. Raborn, director of U.S. Navy's special projects and head of the Polaris missile program, inspects assembly line at Hughes Aircraft Company's El Segundo (Cal.) plant where missile's guidance system is being produced. With him is Joe Ferderber, manager of the missile facility. Admiral Raborn is listening to taped assembly instructions (see audio-visual article, page 42).

AUGUST FASTENER SHIPMENTS DROP OFF

August shipments of industrial fasteners were 89% of the 1956-58 average, on a seasonally adjusted basis. This is two points below the July figure and three points below the average shipments of the second quarter of 1960.

This compares with the mark of 77% of last August, and 101% for all of 1959. Average for 1960 through the first eight months is 96.7%.

GARRETT PERFECTS MECHANICAL PLATING

The George K. Garrett Co., Inc., Philadelphia, was first in the washer and fastener industry to use a new method for zinc plating high carbon steel and spring steel parts free of hydrogen-embrittlement.

The mechanical process was developed by the Minnesota Mining and Manufacturing Company and further perfected by Garrett beginning in 1958.

In Garretizing, the parts, after cleaning, etc., are put into a tumbler along with powdered zinc, promoting compound, water and millions of glass beads of varying size. The ratio of these items depends on the shape of the item being plated and the amount of plating desired.

As the loaded tumbler tosses the mixture, the glass beads strike against the parts. It is this impacting that accomplishes the zinc plating.

HOW IS RESISTANCE WELDING IN EUROPE?

The design lag in resistance welding equipment that until recently gave U.S. manufacturers an edge over their European counterparts no longer exists. This report was made recently by F. B. Jacob and H. W. Stieglitz, assistant to the president and vice-president-engineering respectively of Thomson Electric Welder Company in Lynn, Mass., after their return from a tour of European plants that took them into six countries.

The two engineers studied welding equipment displayed at the Hannover Fair in Hannover, Germany and witnessed manufacturing methods and design features of welding machines made by the principal producers in Germany, Switzerland, Belgium, France, England and Scotland. Jacob and Stieglitz acknowledged that resistance welding has become an indispensable tool in European mass pro-

continued

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BELT CONVEYOR

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ACORN NUT



REGULAR NUT



WING NUT

Available in heat treated Spring Steel... in all popular sizes and finishes.

Crest specializes in custom building fasteners to meet your exacting individual specifications.

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duction methods, and, as is the case in the U.S., has been integrated into high volume production lines.

The European automotive industry is particularly responsible for the accelerating tempo. Plants are geared for high speed operations; welding usually predominates as an assembly method. Complex welding presses equipped with transfer devices and electronic controls duplicate those used by the U.S. auto industry. Automated lines are becoming more prominent to compensate for the labor shortage in Europe. Both of Thomson's managers remarked on the facilities operated by the manufacturers. Space conditions were good, handling equipment up to date. Engineering was thorough and sound.

NO LONGER PRODUCE OWN COMPONENTS

The long standing European practice of accenting self-sufficiency gradually is giving way in many plants. Welding machine manufacturers until recently produced most of the necessary components that went into their units, such as gauges, valves, control devices and machined parts. Now the trend is toward the U.S. method of purchasing such parts, and many plants are being established to supply them. The results—better fabrication time, quicker delivery.

NO IMPORTANT THREAT AT PRESENT

Both Jacob and Stieglitz agree that imports, related to resistance welding machines, are not likely to become a serious problem. At least, not for the next few years. Although European manufacturing costs are about 60% of those in this country, ocean freight charges, duties and marketing costs erase most, if not all, of the differential by the time a machine is delivered.

On the other hand, U.S. companies may find it difficult to export. The advances that have been made in the past ten years mandate that any U.S. machines used in Europe must have unique designs or be adaptable to new applications before their price can be justified in the European market.

HELICAL WASHER INSTITUTE NAMES DIR.

Charles M. Wright, formerly director of standards for the Chrysler Corporation, was recently appointed by the Helical Washer Institute as its executive director, secretary and engineering coordinator, with headquarters in the Detroit area.

Wright will direct a cooperative industry wide program in research and development of standardized procedures for engineering, manufacturing and packaging of Helical Spring Washers.



COMPUTER ENGINEER JOINS AMPLEX

Dennis D. Willard, IBM executive credited with numerous engineering innovations, has been named manager of the Advanced Computer Laboratory for Ampex Data Products Company.

Formerly manager of advanced technical planning, Advanced Systems Development Division at IBM, San Jose, California, Willard joined Ampex July 25.

ALLISON ACQUIRES STUD DRIVER RIGHTS

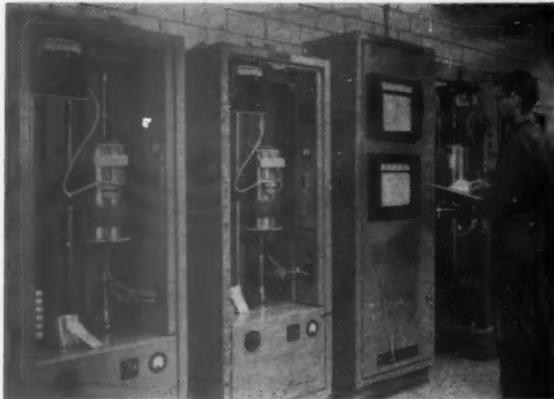
The Alisco Company, Division of Allmetal Screw Products Co., Inc. of Garden City, L. I., New York has acquired the exclusive sales rights to the Aero Thread Stud Driver and component parts, from The Heli-Coil Corporation.

BAIRD BUYS SPRING MAKING MACHINE LINE

The Baird Machine Company, Stratford, Conn., announced recently a revolutionary new line of spring manufacturing machines following acquisition of the line from The Clay Engineering and Manufacturing Co., Chicago.

Reports indicate that extensive market surveys were made which proved the need for the new machine which is capable of producing completed springs in a single operation as opposed to machines in current operation which merely coil the spring and require end forming operations to be performed on additional machinery.

CHANDLER COMPLETES MAJOR EXPANSION



Creep-rupture testing machines aid in the laboratory analysis of fasteners. This bank of testers comprises two 600 psi capacity units that operate at 2200°F and a single unit with a 12,000 psi capacity at 1800°F.

Chandler Products Corporation, Cleveland, Ohio, has just completed a major expansion program creating a total of 85,000 sq. ft. of office, laboratory and manufacturing space.

Warehousing facilities have been automated to the extent that one man operates a storage area with a capacity of 3,000,000 pounds. Direct transfer of raw materials can be made from truck to storage racks at the rate of 1000 pounds per minute. These modernized material handling methods result in better stock placement and inventory control.

New laboratory testing facilities were built in the recent expansion program. The lab is completely equipped to provide chemical and metallurgical control, tests of tensile strength and yield as well as inspection gauging. Chandler specializes in creep and stress rupture tests. Entire batteries of advanced testing equipment are used to assure maximum precision and quality control.



One man using an overhead crane handles the entire warehousing operation. Never more than a few coils have to be moved to reach any piece of stock.

HARPER DECLARES STOCK, CASH DIVIDENDS

The H. M. Harper Company declared a 4% stock dividend in addition to a regular quarterly cash dividend of 15 cents per share on common stock.

The cash dividend is payable Oct. 15 to shareholders of record Sept. 30. The stock dividend is payable Oct. 31 to shareholders of record Sept. 30. On the stock dividend, the company will pay cash in lieu of fractional shares on the basis of \$16 per share.

RYAN TO ENTER DATA HANDLING FIELD

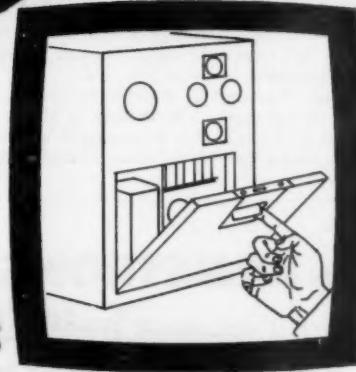
Formation of Ryan Transdata, Inc., to be a subsidiary of Ryan Aeronautical Company, San Diego, Calif., has been disclosed. The new company will specialize in the design and development of data handling equipment. continued

ADAMS RITE FLUSH TYPE LATCHES



Other models available with or without key-operated cylinder lock

For
Installation
in Metal
Cabinets,
Panels, Doors
and Drawers



ADAMS RITE offers a complete line of flush latches designed for attractive, functional installation in metal cabinets such as computer and instrument consoles and electronic equipment enclosures. These latches can be mounted in either horizontal or vertical positions, on doors, hinged panels, or drawers. The bolt is retracted by lifting the spring-loaded handle-flap which also acts as a pull for the panel or drawer.

ADAMS RITE has been manufacturing quality mechanical hardware for over 50 years. The company's engineering staff has a proven talent for developing new solutions to specialized problems. If you have a particular locking or latching requirement, A-R will design and manufacture to your specifications.

Write for complete information or latest file catalog of descriptive literature. Dept. B-1



"Over half a century"

ADAMS RITE
MANUFACTURING COMPANY

540 West Chevy Chase Drive
Glendale 4, California

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According to William G. Alexander, who is to be president of the newly formed company, Ryan Transdata will automatically convert information to a form enabling industrial and government executives and military commanders to make rapid, accurate decisions. Alexander is the former general manager of the Stromberg-Carlson Division of General Dynamics.

Other incorporators, who will constitute Transdata's board of directors, include Fred P. Ciambrone, slated to be vice president of the new company, together with T. Claude Ryan, Robert C. Jackson, and Edward G. Uhl, officers of Ryan Aeronautical Company.

AMERICAN BRAKE SHOE BUYS HERSCOTT

American Brake Shoe Company has acquired the assets of Herscott Corporation, a manufacturer of electrical resistance heating units. Herscott will be liquidated and the firm's plant at Rockford, Illinois, will be operated as the Reslec plant of Brake Shoe's Am-Forge Division.

Robert Watts has been appointed general manager of the Reslec operation, with responsibility for manufacturing, development and marketing activities.



WATTS

MINNEAPOLIS WAREHOUSE FOR INDIANA CAP

The Indiana Cap and Set Screw Company, Franklin Park, Ill., has opened a Minnesota division warehouse in Minneapolis.

The Minneapolis warehouse provides 15,000 square feet of storage space. The facility is 100 feet wide and 150 feet long. The warehouse is managed by Ron Herrick. Salesman Ray Rasmussen is in charge of all Minnesota sales.

THREE NEW PLANT MANAGERS AT LINK-BELT



MATCHETT



STONE



RAMSDEN

Link-Belt Company has announced general managers for three of its plants. T. Webster Matchett, former manager of the Caldwell plant in Chicago, has been appointed general manager of the Pershing Road plant in Chicago. He is succeeded at the Caldwell plant by George Ramsden, general manager of the North Central Division in Minneapolis. Ramsden is succeeded in Minneapolis by Gerald A. Stone, district manager of the Dallas office and factory branch store.

CLECO PROMOTES WALKER TO MANAGER

The appointment of Robert L. Walker as manager, Cleco Division of the Reed Roller Bit Company, has been announced by John Maher, president.

Walker will work directly under Jack Grundy, vice president-operations for Reed, coordinating activities of the expanding division. Walker had served as coordinator of engineering operations with sales prior to his recent appointment. Before joining Reed he was associated with Shell Oil Company in various managerial capacities for 12½ years.

New ARMSTRONG Swivel Pad can't come off



Here's Why
It's STRONGER

Now ARMSTRONG deep throat "C" Clamps have the new (Pat. pend. for) ARMSTRONG Ball-joint Swivel Pad. This "C" Clamp pad, developed by ARMSTRONG Engineers, is tougher than any on the market. Rigorous testing in our own plant first proved this fact, and field tests in factories throughout the country have confirmed our own test results.

The lip of the opening in the ARMSTRONG Ball-joint Swivel Pad is undercut so that when the ball of the screw is inserted, and the lip is permanently forced down, a solid steel wall is formed, inside the pad cavity, completely encircling the ball.

This wall of steel makes it impossible for the pad to come off the screw during normal use. In fact, our tests have proved that it is virtually impossible to intentionally knock the pad off with a hammer—yet the pad is free to swivel through an arc of approximately 40°.

Call your ARMSTRONG
Distributor

Your ARMSTRONG Distributor can offer delivery from stock on this "400-Series" deep throat, drop-forged "C" Clamp with the new Ball-joint Swivel Pad. He also carries in stock the other styles of clamps in the ARMSTRONG Line—the broadest line of drop forged "C" Clamps.

ARMSTRONG BROS. TOOL CO.

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this machine will
drive up to
10 screws at
one time . . .

... reducing assembly costs
and improving quality. Built for
high production jobs where a
fixed set up is practical, this
multiple spindle screw driving
machine automatically feeds
screws from a hopper and
drives them to a predetermined
torque. Evenly distributed pres-
sure eliminates stresses
caused by driving home one
screw at a time. A simple
sliding fixture positions work
pieces accurately.

Machine illustrated shows ap-
plication of multiple spindle
screwing to assembly of
electric power drills.

Send a sample of your as-
sembly and a list of your re-
quirements. We will be happy
to show you how multiple
spindle screw driving can be
applied to your job.

COOK & CHICK COMPANY

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Assembly and Fastener Engineering

REPORT ON DESIGN CONCEPTS IN STEEL

United States Steel Corporation at a special press presentation at the Biltmore Hotel in New York disclosed new design concepts aimed at making steel the top design material for everything from toys and furniture to water towers and stadiums.

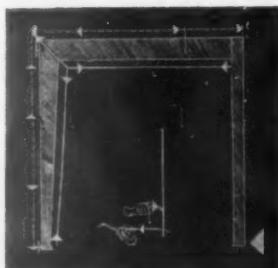
On display were full scale models of toys, a lightweight folding camping trailer and a complete executive office equipped with an entirely new type of office furniture.

The move came after two years of intensive study and development work in the design field. Peter Muller-Munk and Associates, internationally known industrial design firm, was commissioned to conduct the study for U. S. Steel.

Identified as "Study in Steel," the new program is described by Bay E. Estes, Jr., U. S. Steel commercial vice president—marketing, as "a major step in our campaign to create new frontiers for steel."

The design concepts shown by U. S. Steel are based on three major mechanical principles required for structural

continued



U.S. Steel's new "C" leg, developed as part of its "Study in Steel" design project. The leg combines tension, compression and cantilever action to perform its task. Strength is attained by welding steel members together while they are under tension. This simple expedient multiplies the unit's strength far beyond what could be realized with a simple bar bent into a "C" shape. To attempt an approach to this strength with steel or any other metal simply by depending on bulk would require a massive structure unacceptable in modern design.

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on the
LINE . . .**

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SINGLE
ASSEMBLY
NUT AND
LOCK WASHER**

If fast, efficient, economical product assembly is vital to your profit picture . . . KEPS are your answer! Nut and washer are applied in one simple operation. Torsion-tightening points on washer provide vise-like grip. When your fastener requirements call for standard or special-purpose bolts, screws or nuts . . . call for National Lock. Our extensive facilities assure uniform quality . . . on-time delivery. Write us.

KEPS, registered trademark of Illinois Tool Works

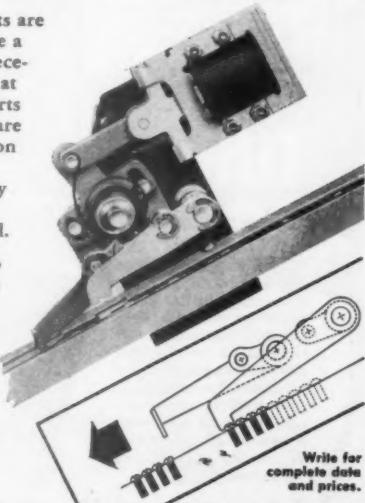
NATIONAL LOCK
FASTENER DIVISION • NATIONAL LOCK COMPANY
ROCKFORD, ILLINOIS

Efficient Parts Control with **DIXON Escapements** HANDLE PARTS UP TO 3" SIZE

For Solenoid...Air...or Mechanical Operation

Dixon Escapements are designed to handle a broad range of piece-part requirements at rates up to 200 parts per minute. They are ideal for application to screwdrivers and other assembly equipment, either standard or special.

You won't need to experiment. These standard units save engineering and construction time and have the important advantage of replacement parts being available from stock.



DIXON AUTOMATIC TOOL, INC.
2309 23rd AVENUE • ROCKFORD, ILLINOIS

EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

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November, 1960

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efficiency—tension, compression, and cantilever action. All three forces are dependent on the inherent strength of the structural material involved.

"The designer has shown," Estes said, "that the full potential of steel can only be realized if the creativity of the designer is wedded with time-proven mechanical principles. We feel we have only begun to probe the surface of steel's full capabilities. Only time and further study will reveal the full range of usefulness locked within this vibrant metal."

Following a showing to customers, designers, fabricators and manufacturers in the New York area, U. S. Steel will take its design exhibit on the road for showing in selected sales districts across the country.

TOWNSEND ADDS EXECUTIVE TO STAFF



Townsend Company has named David J. Belcher to the newly created post of assistant to vice president Edmund B. Buster, who is in charge of Townsend's West Coast operations with headquarters in Santa Ana, Calif.

Belcher joins the Beaver Falls, Pa., company's West Coast operations from Kaiser Steel Co.'s Fabricating Division, where he was a contracts administrator.

OWATONNA TOOL ADDS WEST COAST REPS

John Hann and Robert Wilkenson have been appointed district sales managers for the Oregon, Washington and Northern California territory by Owatonna Tool Co., Owatonna, Minn.

HUCK NAMES GARRETT PURCHASING DIR.

William A. Garrett has been appointed director of purchases for Huck Mfg. Co.

Garrett brings a background which includes six years in merchandising and sales and seven years in purchasing.

A standard hex nut of 14 carat gold was presented to purchasing director Yvonne Ebersole of National Machine Products Co., Utica, Mich., upon completion of 25 years service. Ebersole preferred the gold nut to the usual gold watch.

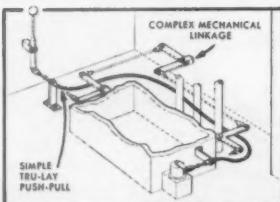


LAWYER JOINS ASSOCIATED SPRING

Edwin V. Ladd, Jr. has been appointed director of corporate development of Associated Spring Corporation. Ladd will be responsible for the consideration of acquisitions and mergers and, in addition, will act as house counsel on legal and patent matters.

Formerly assistant secretary and house counsel for Sun Chemical Corporation, Ladd served that company since 1954. Previously, he had been a member of the New York City law firm of Pennie, Edmonds, Morton, Barrows and Taylor, and the Cleveland law firm of Oberlin and Limbach.

TRU-LAY PUSH-PULL DATA FILE SHOWS HOW TO SIMPLIFY AND IMPROVE DESIGN



Push-Pull remote controls, shown here, are flexible, have but one moving part, and give a lifetime of accuracy. Mechanical linkages are complex, are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.

This Push-Pull Data File—containing 7 engineering bulletins—will show you how these flexible controls have eliminated mechanical linkages on hundreds of products. You can make your products more useful, easier to sell, with Push-Pull controls. Write for your Data File today.



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FOR INSULATING

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TO STUDY BUILDING FASTENERS AT CONF.

A conference-workshop on "Fasteners and Anchorage Devices for Industrial Curtain Walls" will highlight the 1960 Fall Conference of the Building Research Institute. Sessions will be held at the Shoreham Hotel, Washington, D.C. from Nov. 15 through 17.

Directing the program will be William Wyckoff, assistant sales manager of the Townsend Co., Ellwood City, Pa., who is chairman of the BRI Planning Committee on Mechanical Fasteners in Building.

BUZBY COMPLETES TRAINING AT UNITED SHOE

Raymond C. Buzby, Jr., of Nashville, area sales technician for United Shoe Machinery Corporation's Powasert line of automatic tacking, nailing and screw-driving machines, has completed a special course of training at the firm's headquarters in Boston.



Buzby will lend technical assistance to salesmen and work with special customers on new machines, multiple installations, and other applications. He will also conduct technical training sessions.

CATALIN CORP. PROMOTES BASTIAN

Edward W. Bastian, vice president, has been appointed general sales manager of the Catalin Corporation of America, New York City. He will be responsible for the sales in all product lines.

continued

REDUCE FATIGUE
INCREASE PRODUCTIVITY

Bridgeport
TRADE MARK
GENUINE
CUSHION GRIP NUT DRIVER

Blisterproof oil & water resistant
Nitrile Rubber Grip permanently locked into tough amber handle

New! Patented Interlocked "Tongue & Groove" Handle . . . Cannot slip, slide, twist or come off

Now for the first time you can obtain Nut Drivers with all the proven advantages of the famous Bridgeport CUSHION GRIP!

- * SUPER COMFORTABLE resilient Nitrile Rubber never hurts the hand!
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- * FULLY GUARANTEED *PATENT NO. 2871899

9 sizes in open stock:
3/16", 7/32", 1/4",
5/16", 11/32", 3/8",
7/16", 1 1/2", 9/16"
\$1.10 to \$1.60 list.

Available through jobbers or write manufacturer

THE BRIDGEPORT HARDWARE MFG. CORP.
BRIDGEPORT, CONNECTICUT
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November, 1960



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"extras" when
you specify

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FASTENERS—

Service — 40 sales representatives all over the country for prompt, fast service.

Reliability — Quality controlled by the oldest established lock nut manufacturer in the U.S.

Stock — Large inventories to ensure out of stock delivery on all catalogued items.

Speed production and lower costs on your products with this GRIP NUT family of GRIPCO FASTENERS. Qualified fastener engineers are available for consultation on all your assembly problems. Consult the yellow pages in your phone book under "GRIPCO" for the one nearest you.



GRIPCO CENTERLOCK NUT
Locking feature in the center for fast feeding. Can be applied from either end.



GRIPCO COUNTERSUNK WELD NUT
With or without self-locking threads. Countersink protects threads from weld spatter.

Other Gripco Products:

- Brass Toplock or Centerlock nuts.
- Miniature weld and clinch nuts, with or without lock.
- Toplock and Centerlock Hi Nuts.
- Standard Semi-finish full and jam nuts.
- Stainless Steel lock, weld and semi-finish nuts.
- Cold formed special nuts or parts to print.

Send for samples and NEW CATALOG today

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125

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Subsidiary of Heli-Coil Corporation,
Danbury, Conn.

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Bastian joined the firm as a salesman in 1945 and later became a member of the divisional sales management group. He was appointed a vice president in 1953.

ADAMEK MOVES UP TO V-P AT PHEOLL

Stanley C. Adamek has been promoted to vice-president of operations at Pheoll Mfg. Co., Inc., Chicago, announced Robert P. Lord, president. He will direct the operations in four Pheoll division plants.

Adamek brings to his new position 20 years of experience in fasteners. Since joining Pheoll in 1953 he has served as plant manager, works manager, manufacturing manager and general manager.

REICHHOLD TO EXPAND FLORIDA PLANT

Reichhold Chemicals, Inc. plans to expand its Jacksonville, Florida, facilities to include a ten-million pounds-per-year combination unit for the production of polyester and alkyd resins, Henry H. Reichhold, president, announced.

To be built at the cost of approximately \$500,000, the unit will include the sixth polyester facility to have been added by Reichhold during the past five years.

VOI-SHAN PROFITS UP, SALES DOWN

Voi-Shan Industries, Inc. reported a rise in profits of 5% over the previous year despite an appreciable drop in sales for its past fiscal year ending June 30, 1960.

Although sales fell to \$16.5 million from nearly \$26 million, operating income in fiscal 1960 climbed to \$941,595—an increase of nearly \$46,000 over the previous year, Mason Phelps, president, reported.

Phelps revealed that the firm's decrease in sales and rise in profit primarily stemmed from the April, 1959 sale of the Industrial Fastener Division and Impact Extrusion Department which, at the time of their sale, represented operating losses.

NEW PARKER-KALON PACKAGES AND LABELS

Parker-Kalon, manufacturer of tapping screws and other threaded fasteners, announces a new system of unitized packages, and new easy-to-read labels which indicate the type, size, number, head style, finish and quantity of the contents of each carton.

Users of production quantities of fasteners will receive their bulk orders from P-K distributors in P-K's new Bulk Keg. This carton contains 2500 to 25,000 pieces, depending upon size and type of fastener. The tear-tape feature on these cartons permits quick opening.

Thousands-at-a-time users of tapping screws can order the P-K Grand-Pak, containing 1,000 Pan Head Type A tapping screws in bulk. Or ten Grand-Pak cartons can be delivered by the distributor in one master shipping container.

For users of gross packages, ten 1-gross packages are available in the intermediate size container, and ten of these in turn can be delivered in the master shipping container.



SPECIAL RIVETS
like some of the samples shown here . . . or the more commonly used tubular and split rivets . . . they're all alike to the American Rivet Co. And always—our own special brand of quality and service that gets you what you want when you want it.

THE AMERICAN RIVET CO., Inc.
847 N. Kedzie Ave., Chicago 51, Ill.

Write for price list. For specials, send specifications for prices.

BUY AMERICAN Tubular and Split RIVETS

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**Industry's
NEWEST
Production
TOOL**

MOLYKOTE® G LUBRICANT

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
- THE HIGHER THE LOADS, THE GREATER THE MARGIN OF SUPERIORITY OF MOLYKOTE G

Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA-MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone Fireside 8-3724. Plant in Stamford, Conn., Munich, Germany and Strasbourg, France.

THE ALPHA-MOLYKOTE CORP.
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.

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COMPANY _____
ADDRESS _____
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Assembly and Fastener Engineering

No

BREAK GROUND FOR ENGINEERING SCHOOL

Ground was broken in September for Polytechnic Institute of Brooklyn's new Graduate Center, Long Island's first graduate school of engineering.

The facility, with attendant research laboratories, is being established at a cost of \$1,600,000 on 25 acres of land located on Route 110, in Farmingdale. The site was donated to Polytechnic by Republic Aviation Corporation.

The approved plans for the center call for two buildings with a total of 65,000 square feet of floor space.

Study will be restricted to graduate work leading toward the master's and doctor's degrees in full-time and part-time, day and evening sessions. Courses will be offered by the departments of aero-space engineering, electrical engineering, mechanical engineering, mathematics and physics.

SYNTEX NAMES CONN. DISTRIBUTOR

The Synflex Products Division of Samuel Moore & Co., Mantua, Ohio announces the appointment of the R. B. Birge Company, Bridgeport, Conn. as its master stocking distributor for the state of Connecticut.

MANAGEMENT CHANGES AT NAT'L ELECTRIC

Election of Simon Fisher, general manager of National Electric Welding Machines Co., as president succeeding Edward C. Smith, who has resigned, was announced. Fisher will remain as general manager, a post he has held since 1955.

Smith, president of the company since 1933 when he and four others organized it, will step up to a newly created office as chairman of the board.

continued



SMITH

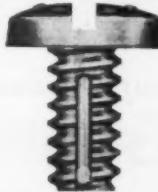


FISHER

LONG-LOK®

self-locking

TERMINAL STRIP SCREWS



- Eliminate lock washers

- Will not shake loose
- Insure reliability of circuits

These specially developed self-locking screws resist shock and vibration, eliminating the possibility of short circuits due to screws working loose. They will not affect conductivity.

Because they eliminate lock washers, they save weight and speed assembly time.

They are reusable, meet MIL-F-18240 specifications and can be head marked for self-lock identification.

LONG-LOK Self-Locking Terminal Strip Screws are available in all thread sizes and styles. For original equipment installation or overhaul—military or commercial—they provide highest reliability of component and system.

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A DIVISION OF ILLINOIS TOOL WORKS

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Fisher joined National Electric in 1935 as a shop electrician. Four years later he was placed in charge of the experimental department. In 1941 he joined the sales staff and in 1946 was appointed director of sales and was elected to the board of directors.

Fisher is vice president of the Resistance Welder Manufacturers' Association, and a member of the American Welding Society.

ALPHA-MOLYKOTE SETS UP MIDWEST CENTER

Establishment of a branch office and technical service center in Chicago is announced by The Alpha-Molykote Corp., Stamford, Conn. R. B. Dost, formerly president of R. B. Dost, Inc., Chicago, has been named Midwest district manager.

SWEET REPRESENTS NYLOK IN CALIF.

Terry S. Sweet has joined the Nylok Corporation as district sales engineer and will provide technical sales service for the San Francisco Peninsula and Northern California areas. The district office will be located in Millbrae, California.

FASTENERS, INC., NAMES MUTZ PRESIDENT

Walter E. Mutz, treasurer and co-owner of Chelsea Clock Co., recently was named president of Phillips Screw Company's wholly-owned subsidiary, Fasteners, Inc.

Mutz is 57 and a native of Boston. He began as a brass finisher at Chelsea Clock in 1925. He moved up through foreman, superintendent and vice president in charge of manufacturing to the present role which he assumed 15 years ago.



DECKER Industrial FASTENERS

Decker Industrial Fasteners are manufactured to meet your demands for a better, more positive method of parts assembly. All Decker Fasteners, standard—or special—are produced via the cold-head process to assure a uniform quality with exceptional economy.

Study your production applications now and see for yourself how many ways Decker Fasteners can save your assembly time and dollars. Decker is ready to serve you—any quantity, type or size.

**DECKER NUT
MANUFACTURING CORPORATION**
1900 N. Clark Road, Albion, Michigan

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Robert C. Singleton, vice president-engineering of Gregory Industries, Inc., demonstrates the new Nelson pin-welder. Dr. Vernon C. Abbott, a director, observes. The unit was introduced at the company's annual shareholders meeting.

SKF NAMES PRODUCT ENGINEER

Appointment of Francis B. McKee to the post of product engineer for the Reed Instrument Bearing Co.—a division of SKF Industries, Inc.—has been announced by O. M. Bergethon, Reed general manager.

In his new capacity, McKee will specialize in advanced bearing technology application studies at the division's Los Angeles headquarters.

HARPER ADDS INDIANA DISTRICT MGR.

George C. Burke has been appointed district manager in Indiana for The H. M. Harper Company, Morton Grove, Ill. Burke, who will have his headquarters in South Bend, has been a sales representative for 12 years in Michigan and Indiana for the Buffalo Bolt Company.

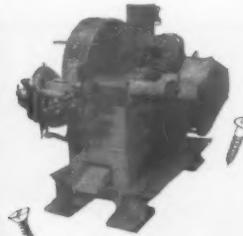
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NAIL MAKING MACHINES
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WRITE FOR CATALOGS!

Also—a complete stock
of new and used Machine Tools
and other equipment.

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CHANCE VOUGHT ADDS ENGINEERING MGR.

L. C. Josephs, director of engineering for the Aeronautics Division of Chance Vought, has announced the appointment of N. W. Tillinghast as VTOL engineering manager. Tillinghast formerly was employed by Ryan Aeronautical, San Diego, where he was a section chief in the flight test division working on the X-13 Vertijet and the Ryan deflected slipstream VTOL (vertical takeoff and landing) airplane.

ADHESIVES ENGINEER JOINS GOODRICH

Joseph Bayer has joined B. F. Goodrich Aviation Products as staff engineer of the company's new products development group.

Bayer is charter president of the midwest chapter of the Society of Aerospace Material and Process Engineers and is a member of the organization's national steering committee. Since 1954, he has been associated with the aircraft industry with special responsibilities for establishing adhesive bonded honeycomb processes.



SALES UP, BOWMAN DECLARES DIVIDEND

The Bowman Products Co., Cleveland, has declared a 22 cent per share dividend payable October 28th to stockholders of record October 14th.

The 22 cent dividend is the same amount paid in both July and April on the 729,000 shares outstanding. This number of shares reflects a 20 for 1 split that was announced in February.

C. F. Devine, Bowman president, reports his company's net sales for the first six months of 1960 were \$8,937,494, a gain of 7.2 percent over the 1959 first half net sales of

continued

Speed Tying Operations!



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TWIST

NO KNOTS TO TIE!

Cut your tying time in half! Hanscom-Ties are the fast, sure way to bundle wires, cords, coils, etc. Nothing to tie. Just wrap 'em around and twist. For temporary or semi-permanent holding. Available in cut lengths 1" to 24" and on spools — bright colors or printed. Prices from 26c per thousand. WRITE FOR SAMPLES and TRY 'EM YOURSELF.

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5 Virginia Avenue
Natick, Mass., U.S.A.

Top view of Hanscom-Tie is shown. Bottom is flat.

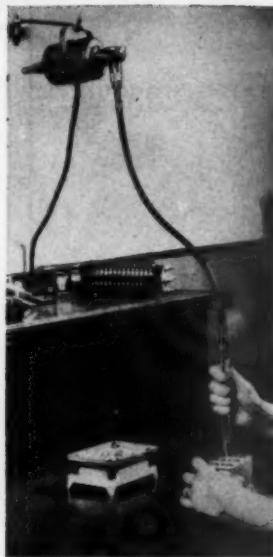
Hanscom-Ties

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November, 1960



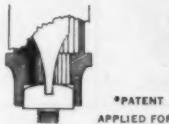
**Spectacular
new
production tool
for
small assemblies**



FOREDOM *miniature* power screwdriver and NUT RUNNER

electrically driven
flexible shaft type
with exclusive
SCREW PICKUP / FINDER*

picks up screws
of any material!!



*PATENT
APPLIED FOR



Use this completely miniaturized power packed tool anywhere, in any position. It's a new concept for regular production or for special and delicate jobs inaccessible or awkward for other power drivers. In portable or hang-up models, it has adjustable touch control, weighs only 5½ oz., measures just 8" long. Available with a full range of quick changeover bits for screws and nuts from #0 to #4 — even larger in some cases.

If you're working on instruments and controls, aircraft, missiles, relays, switches or any of a host of other applications, this little powerhouse can probably mean substantial savings. Write for the name of our nearest distributor, and Bulletin No. 224-A-9

FOREDOM ELECTRIC COMPANY, INC.
BETHEL, CONNECTICUT.



Manufacturers of miniature flexible shaft power tools since 1922
Use postpaid card. Circle No. 286

\$8,331,897. He predicts that sales for the full year of 1960 should amount to \$19,000,000.

HAPMAN ACQUIRES KLENK EPOXY



Melvin S. Huffaker, president of Hapman Corporation, signs the finalizing papers of the Klenk Epoxy Corporation acquisition. Looking on are O. K. Gardner, executive vice president of Hapman (seated), and William C. Klenk, III.

Klenk Epoxy Corporation, Detroit, has been acquired through an exchange of stock by the Hapman Corporation, Kalamazoo, Mich. Klenk Epoxy will be a wholly owned subsidiary and operate as an independent division of Hapman Corporation, along with its Tubular Conveyor and Super Market Equipment Divisions.

William C. Klenk will be executive vice president in charge of the new Klenk Epoxy Division of Hapman Corporation.

THOMSON APPOINTS DETROIT DEALER

The Addy and Luby Machinery Company of Detroit has been appointed as representative for Thomson Electric Welder Company of Lynn, Mass. Addy and Luby will be the exclusive dealer in the area for Thomson's entire line and will maintain current design information and appropriate service facilities.

ANTI-CORROSIVE NAMES BOSTON REP.

Dean Skillin has been appointed by Anti-Corrosive Metal Products Co., Inc., of Castleton-on-Hudson, New York, to head its Boston office serving eastern New England. His background includes five years of sales experience in precision bearings and two years in plastics as well as experience in industrial fastener sales.

PERMALI ADDING TO PENN. PLANT

A \$200,000 expansion program, providing some 11,000 square feet of additional factory and office space, is underway at the plant of Permal, Inc. of Mt. Pleasant, Pa. The company, with affiliates in Canada, England and France, manufactures a technical plastic laminate with a wide variety of applications, including non-metallic fasteners.

SALESMAN INGALLS PROMOTED BY MILFORD

David R. Ingalls has been promoted by the Milford Rivet & Machine Co., Milford, Conn., to district sales manager for the Midwest. His headquarters will be in Aurora, Ill. The University of Bridgeport graduate has been with the company for five years in the sales department.



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YOU CAN *Automate* WITH NATIONAL RIVETERS

Automated fastening does not mean thousands of dollars of expense for multi-headed riveting equipment.

Over 90% of the riveting machines in use today are low cost, single riveters, easily converted to new products and new jobs. National has a complete line —including multi-headed units where the job warrants.

National semi-tubular and tubular rivets and riveting equipment is flexible, rugged, low cost. Its use speeds production, often improves quality of the finished product and slashes labor costs.

Find out today. There is no obligation for National's prompt answers to your fastening problems. Send a blue print or a sample of your fastening job.

**NATIONAL
RIVET & MFG. CO.**

211 Main St.
Waupun, Wis.



NATIONAL RIVETS
TUBULAR. SPLIT. SOLID
ALL METALS

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POP RIVET INTRODUCES NEW PACKAGING

Designed especially for simple packaging of small quantities of rivets and shelf-stocking by distributors, a new Pak box is announced by the Pop Rivet Division of United Shoe Machinery Corporation, Shelton, Conn.

Constructed to withstand rough handling, the box will hold up to 1000 of the rivets. It is attractively designed for counter selling and display. On one end of the cover, white space has been provided to permit distributors to imprint their own labels and markings.

The boxes come ten to a standard carton and must be ordered from the factory in multiples of ten.

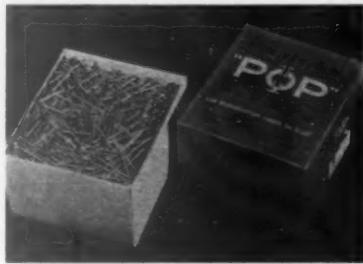
ALLMETAL SUBSIDIARY CHANGES NAME

Allmetal Screw Products Co., Inc., Garden City, N.Y., announces that the name of its wholly-owned subsidiary, Blumberg Supply Corp., Hempstead, N.Y., has been changed and the company moved to new quarters. It will be known as the Alisco Company, Division of Allmetal Screw Products Co., Inc., at its new address in Garden City.

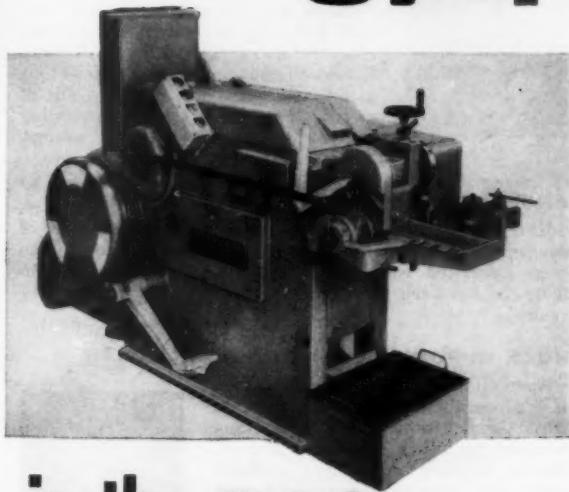
NEW DISTRIBUTORS, OFFICE FOR C.E.M.

C.E.M. Company, Inc., Danielson, Conn., has appointed two new stocking distributors in Southern California: Bearing Sales Co., Los Angeles, and Miner & Assoc., Inc., El Segundo.

continued



ROY SP-1



is the **BIG**
VALUE
in **HIGH SPEED HEADERS**

If you cold-head screws, bolts, rivets or similar parts you owe it to yourself to see the ROY SP-1 (SDDS) High Speed Header. The SP-1 is of advanced design cold-heading 275 *precision* pieces on $\frac{1}{4}$ " diam. and smaller blanks — up to $1\frac{1}{2}$ " in length. The Roy SP-1 gives top performance because it is made to top quality standards!

Dollar-for-dollar the SP-1 is incomparable — you must see it to believe it — write for details today.



*Another Famous Member
of the ROY "Family" —
Model C SCREW SLOTTER*

If you can't come to Farmington for an actual demonstration, we will come to you in our Mobile Unit.

ROY MACHINERY & SALES, INC.

NEW BRITAIN AVE. • FARMINGTON, CONN.

Use postpaid card. Circle No. 290

STANDARD LOCK WASHER & MFG. CO., INC.
17 VIKING TERRACE • WORCESTER, MASS.

Use postpaid card. Circle No. 289

November, 1960

The company has also opened a new office in La Puente, Calif., with William A. Trumble serving as manager.

ENGINEER FORMS ABRASIVES COMPANY



Benjamin F. Post, former research and development engineer in the abrasives field, has announced the formation of Custom Abrasive Products Company, Inc., Trenton, N.J.

Capco will not sell equipment, Post said, but will concentrate on applying scientific knowledge of the limitations, advantages and applications of various media and compounds to the fields of metal cleaning, coloring, preparation for plating and finishing of castings, screw machine products and stampings.

ANCHOR ADHESIVES PROMOTES BEADERSON

Irving Bederson has been appointed sales manager of Anchor Adhesives Corporation, Flushing, N.Y. Bederson has been associated with the company since its inception in 1951, and has been in the adhesive industry for over twenty years.

HUCK APPOINTS CALIFORNIA SALESMAN

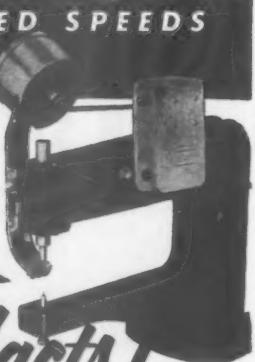
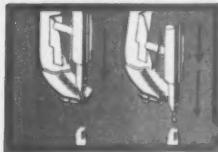
Appointment of O. L. (Bill) Horn as engineering representative to serve West Coast customers has been announced by Huck Mfg. Co., Detroit. Horn's territory assignment includes upper Los Angeles County, mid-state California and southern Nevada.

Horn brings to his new job nearly 20 years of experience in engineering, sales and management positions. He had been Western sales manager for American Metal Bearing Co.



ELECTRIC FEED SPEEDS EYELETTING

EXCLUSIVE
SIMPLIFIED EYELET-RELEASE



Get the facts!

on the New Low Cost ETCO AE-100

This new foot-operated (or fully automatic air-operated) machine has a jam-proof, electrically driven feed. The belt driven agitator, built into the hopper, automatically feeds the eyelets to the track and down to the work position, enabling the operator to work at his fastest speed. Exclusive, simplified, foolproof, eyelet-release prevents waste of eyelets.

The generous 11" throat depth and high overhanging arm provide excellent visibility and permit easy handling of large pieces. Interchangeable tracks accept all standard make eyelets and sizes. Send for complete information.

for

Printed Circuits
Component Assemblies
Cloth & Leather
Assemblies



ETCO TOOL
COMPANY, INC.
236A BROADWAY
CAMBRIDGE, MASSACHUSETTS

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POLYMER DEDICATES PLANT EXPANSION



Polymer Industries Inc., top management group (left to right): Richardson Thurston, vice president & general manager, Dr. Moses Konigsberg, vice president—market planning, Dr. Frank C. Campins, president, Dr. Howard L. Kane, vice president and technical director, Mr. John W. Ogletree, vice president, textile services.

Polymer Industries, Inc., a producer of industrial adhesives and textile specialty polymers, dedicated its recently-completed million-dollar plant expansion in Springfield, Connecticut.

This dedication is a milestone in a period of growth, which has seen Polymer expand from a modest one-room shop in Astoria, Long Island, in 1946 to its present position with annual sales in the millions.

The expansion, which doubles the previous laboratory, production, office and warehousing space, was started in March of 1959.

The new facilities include, in addition to an all-new general office area, a tank farm, a solvent-mixing plant, a polymerization plant, and a 100% increase over former production and laboratory areas.

PROMOTION MGR. AT PORTABLE ELECTRIC

Portable Electric Tools, Inc., Chicago, has appointed John T. Letkey as sales promotion manager. He was formerly associated with Fairbanks, Morse & Company.

JACK NUT

The Only
Blind Fastener
Which Grips Any Material
From 0" To $\frac{3}{8}$ " Thick

EASY TO INSTALL

- 1 Insert Jack Nut into hole. Needs only $\frac{1}{8}$ " expansion space.
- 2 Turn in screw to collapse spider anchor backing by exerting pull on thread.
- 3 Jack Nut now is installed and ready to receive attachment screw.

The Jack Nut cuts cost, speeds assembly, solves hitherto impossible fastening problems. Can be used as a rivet and/or blind fastener. It's versatile, easy to use and no special tools are needed.

The only blind fastener with threads which grips any material from 0" to $\frac{3}{8}$ " thick. Needs only $\frac{1}{8}$ " expansion space. Allows holes to be fashioned before, during or after fabrication. Hole size is not critical and special type of hole is not necessary.

Made of quality steel, cadmium-plated. Grips evenly on rough as well as smooth surfaces. Provides vibration-proof assembly. Weight-carrying capacity is limited in most cases only by strength of the material in which used.

Sold By Wholesale Hardware, Electrical
Wholesale & Industrial Supply Distributors

MOLLY CORP.
230 N. 5th St., Reading, Pa.

SPECIFICATIONS

| CAT. NO. | A | B | C | D | E | F |
|-----------|-----------|-------------|-----------|--------------|--------|-------------|
| | CAP. DIA. | CAP. THICK. | BODY DIA. | O'ALL L'GTH. | THREAD | MAX. SPREAD |
| 4-S, JN | 15/32 | 3/64 | 9/32 | 9/16 | 6-32 | 43/64 |
| 4-L, JN | 15/32 | 3/64 | 9/32 | 3/4 | 6-32 | 43/64 |
| 6-S, JN | 17/32 | 1/16 | 3/8 | 11/16 | 10-24 | 25/32 |
| * 6-S, JN | 5/8 | 1/16 | 27/64 | 3/4 | 14-20 | 13/16 |

S for 0" to $\frac{3}{8}$ "; L for $\frac{3}{8}$ " to $\frac{1}{2}$ "

* 8-32 & 10-32 threads available

** 10-24 & 12-24 threads available

NOTE: 4-S, JN & 6-S, JN also available in brass

Use postpaid card. Circle No. 292

STANDARD SCREW ELECTS NEW SECRETARY

Worthington Mixter is the new secretary of Standard Screw Co., Bellwood, Ill. He will make his headquarters at the Hartford, Conn., Machine Screw Division.



Mixer has been associated with the Hartford division since 1956 and will continue to serve the division as controller. In 1959 he also became assistant secretary of the parent organization.

HUGHES APPOINTS CHAFIN SALES REP.

The firm of Earl Chafin Associates, Los Angeles, has been appointed sales representative for the line of thin metal weiders manufactured by the vacuum tube products division of Hughes Aircraft Company, Oceanside, Calif.

The firm will serve Southern California and Arizona for the division.

BURDICK NAMED CLEVELAND CAP SLS. MGR.

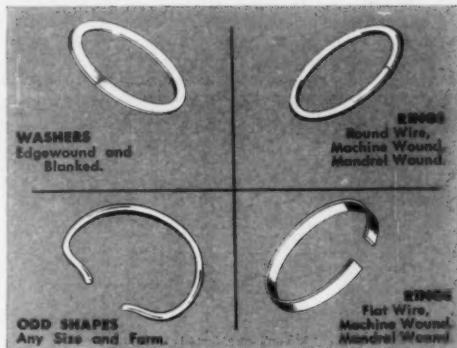


Herbert D. Burdick has been appointed general sales manager of The Cleveland Cap Screw Co., a subsidiary of Standard Pressed Steel Co.

Burdick was employed by the Republic Steel Bolt & Nut Division, rising to assistant general manager of sales. He joined Cleveland Cap Screw in January of this year as assistant general sales manager.

In other appointments, Roland P. Schultz was named treasurer and William G. Bratton, assistant treasurer, of the company.

continued



solder preforms

Silver Copper Aluminum Soft Solders



Write for 16 page booklet on better brazing.

1. End Wasted Time In Placing Solder in position for brazing.
2. Speed Assembly Work.
3. Eliminate Rejects.
4. Meter Solder to Flow In and Around Joints.

LUCAS-MILHAUPT Engineering Co.
5060 South Lake Drive, Cudahy, Wisconsin

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Togetherness

matters with industrial fasteners, too!

Togetherness, industrial style, has a special meaning at Thompson-Bremer because we are one of the few fully integrated manufacturers of Sems, lock washers, thread-cutting screws, terminals and cold-headed specialties. With our engineering services and components manufacturing together under one roof, we can give you faster, more individualized service at competitive prices. We'll bid on your specials requirements, or fill orders for standard items on short notice from the extensive line of EVERLOCK products stocked by your local distributor.

If you buy or specify industrial fasteners, you want whatever your company assembles to go together economically and stay together reliably. Send for catalog and samples or call your EVERLOCK representative.



Thompson-Bremer & Co.
Division of
American Machine
& Foundry Company

Thompson-Bremer & Co., Dept. 28
228 N. LaSalle St., Chicago 1, Ill.

Please send me:

EVERLOCK fastener catalogs _____ samples of
EVERLOCK industrial fasteners and cold-headed specialties.

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

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COLD HEADING TOOLS



Largest manufacturer of standard and special heading tools for the fastener industry.

Standard tools are available from stock for nut formers, boltmakers and headers.

"Standardize with Penncraft"

Prices for special and standard tools furnished upon request.



PENN CRAFT TOOL CO., INC.

25910 Michigan Ave. • Inkster, Michigan
LOgan 5-3366

Use postpaid card. Circle No. 295

New sales tool for distributors and representatives of Detroit Stamping Co., Detroit, is a kit showing the full line of portable toggle clamps offered. The small clamps can be evaluated in operation on-the-spot.



SCHENECTADY VARNISH NAMES NEW P.A.

Andre J. Bourgeois has been named purchasing agent, Schenectady Varnish Company, Inc. Since joining the Company in 1956, Bourgeois has served the firm in a wide variety of capacities, including manufacturing and finance.

ROBIN PRODUCTS HIRES SALES V-P

Robin Products Co., Warren, Mich. announces the appointment of John W. Stoutenburg as vice-president of Sales. Stoutenburg will direct an expanding sales program to the automotive and appliance industries.

Stoutenburg was previously vice-president of Mill Strip Products and Korhumel Steel & Aluminum of Evanston, Ill. His background includes 15 years experience in metals technology.



*Why
is*

SPROL *the true
spring* **PIN**

a better fastener?

SPROL PIN comes in Medium, Light and Heavy Duty...

In a majority of applications, the Medium Duty **SPROL PIN** satisfies all requirements, and gives cost savings through increased production by easier and faster insertion. Application in materials too soft, brittle or thin for heavier spring pins is possible with Medium and Light Duty **SPROL PINS**.

Miniature Diameters... **SPROL PIN** is the only spring pin available in $\frac{1}{32}$ " to $.052$ ". And, in diameters as large as $\frac{3}{16}$ ".

Uniform chamfer on ends of every **SPROL PIN** ... insures ease of insertion, without hole damage or distortion.



Write for free TECHNICAL DATA MANUAL. Free samples for specific applications.

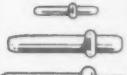


C. E. M. COMPANY

30 SCHOOL STREET, DANIELSON, CONN. • PRescott 4-8571
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50% SAVINGS
with
BEAD CHAIN
Multi-Swage Parts

CONTACT PINS



TERMINALS



JACKS



FRiction CONTACTS



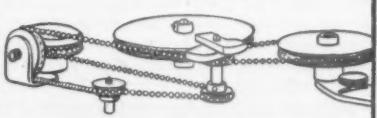
also PRINTED CIRCUIT
MINIATURE PARTS

Contact pins, terminals, jacks or any small tubular parts. Maximum $\frac{1}{4}$ " diameter x $1\frac{1}{4}$ " length.

Send sketch for quotations.

BEAD CHAIN DRIVES

Low-speed positive drives or motion transfer ... at far less cost!



Send for Multi-Swage or
Bead Chain Drive Catalog!

THE BEAD CHAIN MFG. CO.

208 MOUNTAIN GROVE ST., BRIDGEPORT, CONN.
Use postpaid card. Circle No. 297

Assembly and Fastener Engineering

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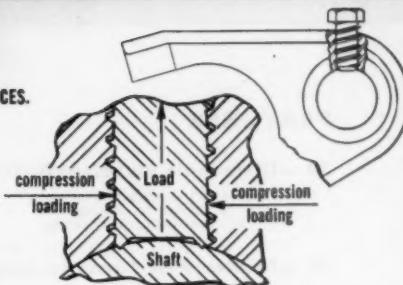
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INDUSTRIAL FASTENER SYMPOSIUM

The third annual symposium, "Industrial Fastener Applications," at the University of Wisconsin will be held Nov. 10-11. For schedule of sessions and registration details contact: Richard A. McCormick, Engineering Institute, Extension Division, 3030 Stadium, University of Wisconsin, Madison 6, Wisconsin.

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Millions of "LOK-THREAD"
fasteners have been used
many years by largest auto-
motive, aircraft, appliance
and other manufacturers.

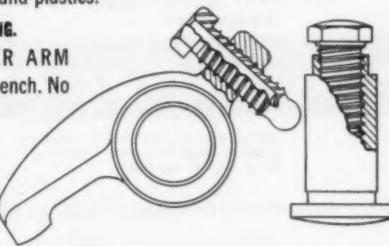


NOTE: PITCH DIAMETER CLEARANCES.

SET SCREW, illustrated, shows how stronger "Lok-Thread" fasteners grip firmly on the 6° locking root. Vibration and work load improve the lock by wedging action. They assemble with holes tapped within standard limits. They cannot cock or wander. Ideal for fastening in light metals and plastics.

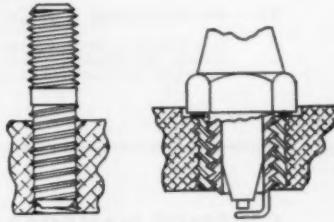
STOP CLOSE (PITCH DIA.) GAGING.

"LOK-THRED" ROCKER ARM SCREWS require only one wrench. No lock nuts used. One hand free for checking clearance. Speeds valve lashing. Now used in steel, cast iron and aluminum.



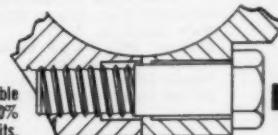
CLOSE PITCH DIAMETER LIMITS UNNECESSARY.

STUDS can be simply used in any class of tapped hole. The coarse LT stud end is stronger than UN-F nut end. INSERTS for cap screws and spark plugs. Tests prove no change in heat range. Used extensively for salvaging expensive parts.



ALL PITCH DIAMETER LIMITS MAY BE CONVENTIONAL

CON-ROD SCREWS provide desired permanent strain (no fretting) with savings of many ounces of reciprocating mass. The dowel-like fit and perfect adaptability have proved ideal during many years of trouble-free service.



All "Lok-Thread" parts are fully interchangeable with conventional threaded parts—40 to 100% gain in tension, torsion and endurance limits.

NORMAL PITCH DIA. LIMITS REQ'D FOR SEALING ONLY.
 Here is a partial list of "Lok-Thread" suppliers:

AMERICAN STANDARD
 PRODUCTS, INC.
 3030 Main St., Hartford, Conn.

FERRY CAP & SET SCREW CO.
 2151 Scranton Road, Cleveland 13, Ohio

THE LAMSON & SESSIONS CO.
 5000 Tiedeman Road, Cleveland 9, Ohio

THE NATIONAL SCREW &
 MANUFACTURING CO.
 2440 E. 75th St., Cleveland 4, Ohio

MAYNARD MANUFACTURING CO.
 2275 Shakespeare, E. Detroit, Mich.

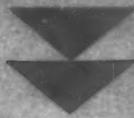
CLAUDE SINTZ, INC.
 1928 Stanley, Detroit 8, Mich.

STANDARD PRESSED STEEL CO.
 Jenkintown, Pa.

UNIVERSAL DIESEL
 PRODUCTS, INC.
 Sturgis, Michigan

LOCK THREAD CORPORATION, 2832 E. Grand Blvd., Detroit 11, Mich.

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DISTRICT MANAGERS • Assembly and Fastener Engineering

EASTERN DIVISION

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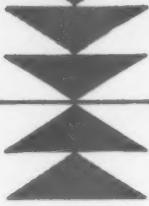
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ONE LAST WORD

THE COOKIE TEAM OF EDUCATED CONFORMISTS



conformist does not advance; he stands still and throws rocks into the path of progress. He squats on the status quo like a stone seal on its base at the entrance of the zoo.

The aim of educators is to make certain that nothing with square corners leaves their cloistered halls; the aim of many corporations is to hire people who will maintain the status quo. Let us have no jagged corners among our round cookies; let no one set off a firecracker in the paneled board room or stick a pin into the smugness of the schoolmaster.

One may deduce that I am not in sympathy with conformity or conformists. I believe with Konstantin that "the conformists' world is a graveyard in which one grave is like another and everyone quite dead." We have no place for such in our society. This is the age in which a cold war rages with the communists, in which nations writhe under the dictator's fist, in which flares an economic battle with foreign nations. It is the age of the irresponsible labor leader, the narrow, profit-minded businessman and the mediocre bureaucrat. This steaming mess is tended on the stove and assiduously stirred by "men of the team" who believe, like Leibnitz, that "this is the best of all possible worlds."

On the other hand, I do not believe in that crowd of self-styled nonconformists, unwashed, unshaved and hatless, who swagger about in turtle-neck sweaters and gibber. These frustrated little

escapists need detain us no more than a curious flea circus. A true nonconformist is, among other things, dissatisfied, intelligent and creative. All creative thinkers are intellectual nonconformists and when they publish the results of their thoughts one will read such titles as, "The Theory of Relativity," or "A Declaration of Independence." Possibly their claim to fame does not lie in the written word. Instead, one may chug up the Hudson in a steamboat, talk through a wire, study by a strangely glowing bulb, or fly through the air like a bird.

We live in the shadow of the scientists, philosophers, artists, political and religious thinkers, all of them nonconformists who were dissatisfied with their world and changed it. In the entire bunch there lurked not one staunch "team man". History is a tabulation of nonconformists, rebels, individualists and, yes, even scoundrels. Would we not be well advised to determine how we may create an environment conducive to the development of men of thought and action? Should we not encourage nonconformist thinking? Are we not silly, in this critical age, hard pressed by a ring of evil situations, to place our faith in a cookie team whose only qualification is it was cut out by the same cookie cutter, and who stalk importantly about in the graveyard, the dead among the dead?

One might well wonder and ask: Are we our own greatest enemies?

Vice President & Editorial Director

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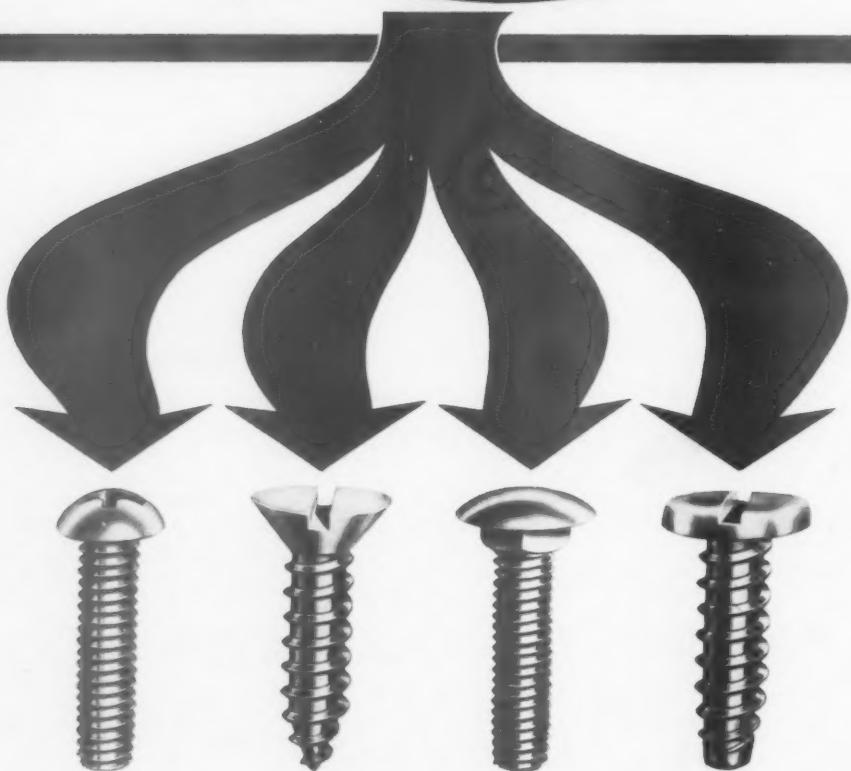
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